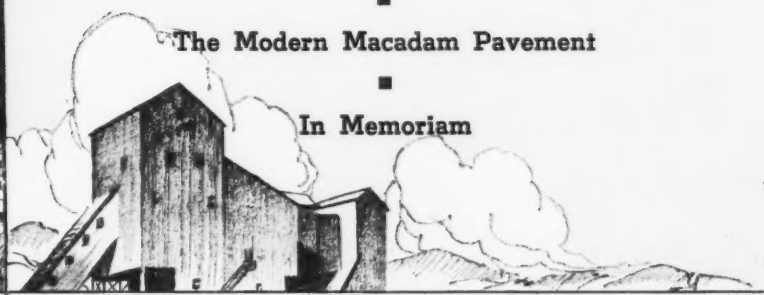
The CRUSHED STONE JOURNAL

PUBLISHED QUARTERLY

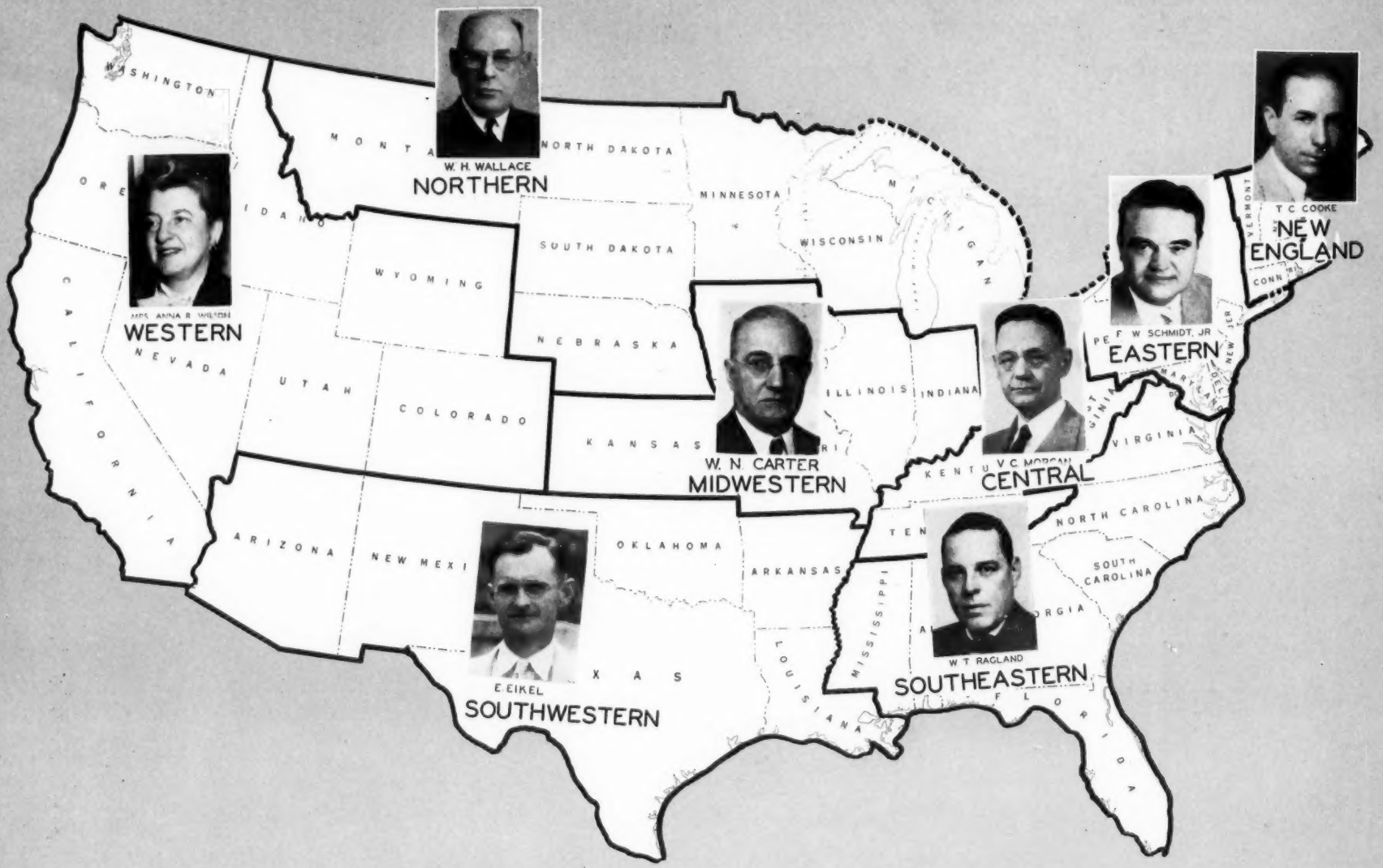
In This Issue



March • 1948

Official Publication
NATIONAL CRUSHED STONE ASSOCIATION

MAP SHOWING REGIONS AND REGIONAL VICE PRESIDENTS FOR 1948
NATIONAL CRUSHED STONE ASSOCIATION



The Crushed Stone Journal

Official Publication of the NATIONAL CRUSHED STONE ASSOCIATION

J. R. BOYD, Editor

NATIONAL CRUSHED STONE ASSOCIATION

1415 Elliot Place, N. W.
Washington 7, D. C.

OFFICERS

W. S. WESTON, JR., President
JAMES SAVAGE, Treasurer
J. R. BOYD, Administrative Director
A. T. GOLDBECK, Engineering Director
J. E. GRAY, Field Engineer
HENRY A. HUSCHKE, Managing Director, Agricultural Limestone Division

REGIONAL VICE PRESIDENTS

W. N. CARTER — W. T. RAGLAND
T. C. COOKE — F. W. SCHMIDT, JR.
E. EIKEL — W. H. WALLACE
V. C. MORGAN — ANNA R. WILSON

EXECUTIVE COMMITTEE

W. S. WESTON, JR., Chairman
G. A. AUSTIN — H. C. KRAUSE
W. N. CARTER — RUSSELL RAREY
COTTRELL FARRELL — F. W. SCHMIDT, JR.
OTHO M. GRAVES — W. F. WISE
A. L. WORTHEN

Contents

W. S. WESTON, JR.
President
Weston and Brooker Co.
Columbia, S. C.

●

Elected President
NATIONAL CRUSHED STONE ASSOCIATION
at its 31st Annual Convention
Cincinnati, Ohio
January 26-28, 1948

H. C. KRAUSE
President
Columbia Quarry Co.
St. Louis, Mo.

●

Elected Chairman
AGRICULTURAL LIMESTONE DIVISION
at its 3rd Annual Convention
Cincinnati, Ohio
January 29-30, 1948

THE CRUSHED STONE JOURNAL

WASHINGTON, D. C.

Vol. XXIII No. 1 PUBLISHED QUARTERLY MARCH, 1948

31st Annual Convention Shatters All Previous Attendance Records

THE 31st Annual Convention of the National Crushed Stone Association held at the Netherland Plaza Hotel, Cincinnati, Ohio, January 26, 27, and 28, 1948, was considered in the judgment of those attending, outstandingly successful from every point of view. Delegates from all sections of the country converged on Cincinnati in unprecedented numbers for the meeting, giving an official registration of 840 for the NCSA Convention alone. For the 3rd Annual Convention of the Agricultural Limestone Division, which immediately followed on Thursday and Friday, January 29 and 30, the official registration amounted to the gratifyingly large figure of 259. After eliminating registrations common to both meetings, the amazing total of 945 results, shattering by over a hundred all previous attendance records.

The 31st Annual Convention was notable not only for its record-breaking attendance; the banquet was considered the most enjoyable in years; interest and attendance at the general sessions were highly gratifying; the forums for operating men justifiably continued to hold the spotlight; and last but by no means least, the Manufacturers' Division Exposition, resumed after a lapse of five years, offered much of interest and value with more comprehensive and varied displays than have been seen since predepression days.

It is not intended in what follows to give a detailed account of our 31st Annual Convention as space does not permit nor could justice be done to the occasion. However, for those who found it impossible to be with us in Cincinnati, the following should prove of interest.

Election of Officers and Board of Directors

At the annual business meeting of the Association held on Tuesday morning, January 27, the election of officers and members of the Board of Directors took place. The Chairman of the Nominating Committee, W. F. Wise, preliminary to submitting the report of the Committee, commented as follows:

"Your Nominating Committee met for long sessions Saturday and Sunday. Its deliberations were both frank and extended.

"According to our by-laws the Association shall be managed by a Board of Directors consisting of forty-eight members. It provides that the President, eight Regional Vice Presidents, the Chairman and two representatives of the Manufacturers' Division, and the Chairman and two representatives of the Agricultural Limestone Division are ex officio members, which leaves not more than thirty-three additional members to be nominated.

"The following names of members are presented to the convention by your Nominating Committee as nominees for election to the Board of Directors. It should be understood that this report does not restrict or prevent the presentation of other nominations but simply reflects the opinion of the Committee which was appointed by your President to make recommendations."

Chairman Wise then submitted his report in detail which resulted in the unanimous election of members of the Board as listed below, of whom Wilson P. Foss, III, R. T. Lassiter, G. D. Lott, Jr., serve on the Board for the first time:

EXECUTIVE COMMITTEE

of the

NATIONAL CRUSHED STONE ASSOCIATION

elected by the Board of Directors at its meeting in Cincinnati, Ohio, January 27, 1948

W. S. WESTON, JR., *Chairman*,
Weston & Brooker Co.,
Columbia, S. C.

G. A. AUSTIN
Consolidated Quarries Corp.,
Decatur, Ga.

W. N. CARTER
National Stone Co.
Joliet, Ill.

H. C. KRAUSE
Columbia Quarry Co.,
St. Louis, Mo.
Representing the Agricultural Limestone Division

COTTRELL FARRELL
Easton Car & Construction Co.,
Easton, Pa.
Representing the Manufacturers' Division

OTHO M. GRAVES
General Crushed Stone Co., Easton, Pa.

RUSSELL RAREY
Marble Cliff Quarries Co., Columbus, Ohio

F. W. SCHMIDT, JR.
North Jersey Quarry Co., Morristown, N. J.

W. F. WISE
Southwest Stone Co.,
Dallas, Texas

A. L. WORTHEN
New Haven Trap Rock Co., New Haven, Conn.

NEWLY ELECTED MEMBERS OF THE BOARD

WILSON P. FOSS, III
New York Trap Rock Corp.,
New York, N. Y.

RICHARD T. LASSITER
Southern Aggregates Corp.,
Raleigh, N. C.

GEORGE D. LOTT, JR.
Palmetto Quarries Co.,
Columbia, S. C.

MRS. ANNA R. WILSON
Granite Rock Co.
Watsonville, Calif.

ELECTED DIRECTORS

G. A. Austin, Consolidated Quarries Corp., Decatur, Ga.

L. J. Boxley, Blue Ridge Stone Corp., Roanoke, Va.

H. H. Brandon, Melvin Stone Co., Melvin, Ohio.

J. Reid Callanan, Callanan Road Improvement Co., South Bethlehem, N. Y.

Bruce S. Campbell, H. T. Campbell Sons' Corp., Towson, Md.

A. J. Cayia, Inland Lime and Stone Co., Manistique, Mich.

H. N. Clark, Dolomite Products Co., Inc., Rochester, N. Y.

F. O. Earnshaw, Carbon Limestone Co., Youngstown, Ohio.

Arthur F. Eggleston, John S. Lane & Son, Inc., Meriden, Conn.

Wilson P. Foss, III, New York Trap Rock Corp., New York, N. Y.

Otho M. Graves, General Crushed Stone Co., Easton, Pa.

G. F. Hammerschmidt, Elmhurst-Chicago Stone Co., Elmhurst, Ill.

R. G. L. Harstone, Canada Crushed Stone Ltd., Hamilton, Ont., Canada.

J. L. Heimlich, LeRoy Lime and Crushed Stone Corp., LeRoy, N. Y.

R. P. Immel, American Limestone Co., Knoxville, Tenn.

N. E. Kelb, Cumberland Quarries, Inc., Indianapolis, Ind.

H. C. Krause, Columbia Quarry Co., St. Louis, Mo.

R. T. Lassiter, Southern Aggregates Corp., Raleigh, N. C.

J. C. Lauber, Trap Rock Co., Minneapolis, Minn.

G. D. Lott, Jr., Palmetto Quarries Corp., Columbia, S. C.

M. E. McLean, East St. Louis Stone Co., East St. Louis, Ill.

Paul M. Nauman, Dubuque Stone Products Co., Dubuque, Iowa.

H. E. Rainer, Federal Crushed Stone Corp., Buffalo, N. Y.

Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio

J. A. Rigg, Acme Limestone Co., Fort Spring, W. Va.

A. Battle Rodes, Franklin Limestone Co., Inc., Nashville, Tenn.

W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill.

James Savage, Buffalo Crushed Stone Corp., Buffalo, N. Y.

A. T. Smith, Rock Hill Quarries Co., St. Louis, Mo.

O. M. Stull, Liberty Limestone Corp., Buchanan, Va.

D. L. Williams, Virginian Limestone Corp., Ripplemead, Va.

W. F. Wise, Southwest Stone Co., Dallas, Texas.

A. L. Worthen, New Haven Trap Rock Co., New Haven, Conn.

REGIONAL VICE PRESIDENTS

In accord with the recommendations of the Nominating Committee the following were unanimously elected as Regional Vice Presidents for the regions indicated with Mrs. Anna R. Wilson, President of the Granite Rock Company, Watsonville, Calif., enjoying the distinction of being the first woman to occupy an elective office in the Association:

Eastern—F. W. Schmidt, Jr., North Jersey Quarry Co., Morristown, N. J.

New England—T. C. Cooke, Lynn Sand and Stone Co., Swampscott, Mass.

Midwestern—W. N. Carter, National Stone Co., Joliet, Ill.

Southeastern—W. T. Ragland, Superior Stone Co., Raleigh, N. C.

Central—V. C. Morgan, Kentucky Stone Co., Louisville, Ky.

Northern—W. H. Wallace, Stone Co., Bay Port, Mich.

Western—Anna R. Wilson, Granite Rock Co., Watsonville, Calif.

Southwestern—E. Eikel, Servtex Materials Co., New Braunfels, Texas.

JAMES SAVAGE
Buffalo Crushed Stone Corp., Buffalo, N. Y.
Re-elected Treasurer

W. S. Weston, Jr., Elected President

Climaxing the report of the Nominating Committee, Chairman Wise announced the recommendation of the Committee for President as follows:

"Gentlemen, your Committee selected for recommendation for the office of President a man whose company through its officers has been closely allied with this Association ever since its early days. Some of the observations I intended to make have already been said to you this morning and I will not repeat them.

"This gentleman is President of his company, he served with distinction in World War II, and I think is known and loved by everyone here. I present the name of Steve Weston, Jr."

There being no further nominations made from the floor, Steve Weston was declared unanimously elected as President and was escorted to the platform by Ex-Presidents A. L. Worthen and J. A. Rigg.

In accepting the high honor accorded him, President-elect Weston spoke as follows:

"I feel on this occasion that I have been presented with a challenge, not just to me, personally, but to me representing the youth of America, and I assume this office with the full recognition that my election here as the youngest national president, to my knowledge, of any like organization in these United States, is more than just the election of president. I feel that you have issued to me a challenge which is clearly a challenge to the youth of America.

"Five times before in my life I have positively felt that I have been challenged—to succeed in the things for which we stand or to go down trying. The first time was with the 29th Infantry Division during the D-Days of France in Normandy; the second time was during the Battle of St. Lo; the third time was during the Battle of the Bulge; the fourth time was at the Ruhr River crossing at Julich; the fifth time was at the Rhine River crossing at Wesel. Once again, and for the sixth time, I feel that I am positively challenged—to succeed through the determination of our youth or go down trying.

"Gentlemen, I accept that challenge. With confidence in our future and the determination of my youth, I will succeed. Greetings, gentlemen."

Tribute Paid to Retiring President, Art Austin

Following President Weston's words of acceptance, Otho M. Graves, acting as temporary Chairman of the meeting paid glowing tribute to the retiring President, Art Austin. Mr. Graves spoke as follows:

"I think by what Steve has said to us that you should be reassured, if any reassurance were necessary, as to his qualifications for the presidency.

"I also feel, as I know you do, a deep sense of loss that Arthur Austin will no longer be our President. Arthur has served this Association better than perhaps some of you know. He has brought to his task intelligence, he has brought experience, valuable assets in themselves, but above that he has brought to us a gentle consideration of other persons' points of view, and those of you who have sat in on Executive Committee meetings or Board meetings know how heated we become in argument, all for the one cause, this Association. Arthur never—and I have seen as much of him as anyone—lost the gentle courtesy which is so characteristic of him.

"I feel that we would be derelict in our duty and denying ourselves a pleasure if, after having happily applauded Steve Weston, whom we are going heartily to support, we did not show in some manner, however inadequte, to Arthur Austin how much we think of him. Arthur!"

The audience arose and enthusiastically applauded whereupon retiring President Austin responded with the following:

"Gentlemen, on one occasion Abraham Lincoln was to make a speech. As he walked out onto the platform he put his tall beaver hat on his chair, and a rather plump lady came in and sat in that chair. When he was through with his speech he turned around to get his hat and the lady rose. He looked over at the lady, and she looked at the hat, and he

said, 'Madam, if you had asked me, I could have told you it would not fit.' Thank you, gentlemen." [Applause]

Representation of the Agricultural Limestone Division and the Manufacturers' Division on the NCSA Board

In addition to their respective Chairmen the Agricultural Limestone Division and the Manufacturers' Division are each authorized in accord with the by-laws to designate two representatives to serve as ex officio members of the National Board.

At the annual business meeting of the Agricultural Limestone Division held on Friday, January 30, H. C. Krause was elected Chairman of the Agricultural Limestone Division and P. E. Heim and S. P. Moore were designated to serve with him on the National Board.

At the annual business meeting of the Manufacturers' Division held on Tuesday, January 27, Cottrell Farrell was elected Chairman of the Division and R. C. Johnson and J. B. Terbell were designated to serve with him on the National Board.

Elections by New Board of Directors

At the meeting of the new Board of Directors held on Tuesday, January 27, the following were elected to the positions as indicated:

Executive Committee

G. A. Austin, Consolidated Quarries Corp., Decatur, Ga.

W. N. Carter, National Stone Co., Joliet, Ill.

Otho M. Graves, General Crushed Stone Co., Easton, Pa.

Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio.

F. W. Schmidt, Jr., North Jersey Quarry Co., Morristown, N. J.

W. F. Wise, Southwest Stone Co., Dallas, Texas

A. L. Worthen, New Haven Trap Rock Co., New Haven, Conn.

In addition to the foregoing the full personnel of the Executive Committee includes the following ex officio members:

W. S. Weston, Jr., President of the Association

H. C. Krause, Chairman of the Agricultural Limestone Division.

Cottrell Farrell, Chairman of the Manufacturers' Division.

Treasurer

James Savage

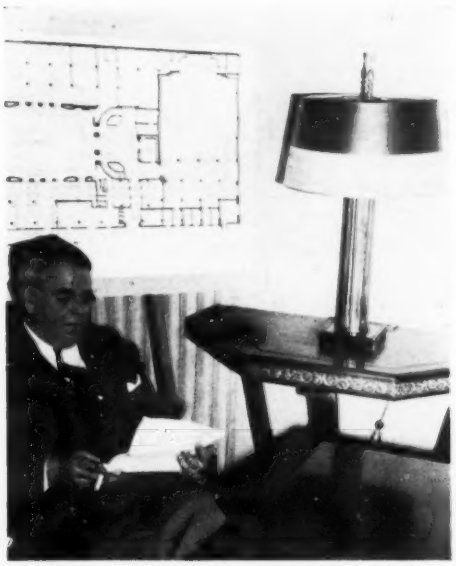
Engineering Director

A. T. Goldbeck

31ST ANNUAL BANQUET, NATIONAL CRUSHED STONE ASSOCIATION
and
3RD ANNUAL BANQUET, AGRICULTURAL LIMESTONE DIVISION
NETHERLAND PLAZA HOTEL, CINCINNATI, OHIO, JANUARY 28, 1948

Field Engineer
J. E. Gray
Administrative Director and Secretary
J. R. Boyd
Honorary Members of the Board
John C. Gall, Washington, D. C.
John Rice, General Crushed Stone Co., Easton, Pa.
H. E. Rodes, Franklin Limestone Co., Inc., Nashville, Tenn.
Stirling Tomkins, New York Trap Rock Corp., New York, N. Y.
Harold Williams, Boston, Mass.

In placing in nomination the name of Stirling Tomkins for honorary membership on the Board (Mr. Tomkins having resigned from active membership because of his retirement from the presidency of the New York Trap Rock Corporation) Mr. Rigg said: "As all of you know, Stirling Tomkins has served this Association for many years as a member of this Board and for many years as a member of the Executive Committee. He has given unstintingly of his time and except during the period while he was in the service of the Red Cross overseas during the late war he has attended, to my knowledge, faithfully all of the meetings of the Executive Committee. He has contributed out of his many years of experience and his fine, calm judgment many constructive ideas and suggestions to the Executive Committee and to the Board. He has not only suggested ideas but has given of his time to carry them out, and while Mr. Tomkins had asked that his name not be placed in nomination for honorary membership, the Nominating Committee, after giving his request careful consideration, felt that the Board would be very



L. W. Shugg, Director of Exhibits, Considers a Difficult Problem

MANUFACTURERS' DIVISION. ANNUAL BUSINESS MEETING LUNCHEON. CINCINNATI, OHIO, JANUARY 27, 1948

remiss in recognizing Mr. Tomkins' value to the Association and to the Board if he were not made an honorary member."

Representing the NCSA on the Board of Directors and Executive Committee of the Agricultural Limestone Division

Russell Rarey

With respect to the representative of the NCSA to serve on the Board of Directors of the Agricultural Limestone Division, Mr. Graves, who had served in that capacity since the establishment of the Division, requested that some other member of the Board be designated to fill that position. Mr. Moore, on behalf of the Agricultural Limestone Division, expressed regret that Mr. Graves had asked that he be replaced and added that the Division was very happy in the selection of Mr. Rarey to serve on its Board to represent the NCSA.

Mr. Moore expressed to Mr. Graves the deep appreciation of the Division for the wise counsel he had given and for the interest he had taken in the work of the Division.

Illness Prevents Miss Beulah M. Davies From Attending Convention

It was a deep shock to her many friends throughout the industry to learn that Miss Beulah M. Davies, Secretary to Mr. Goldbeck, was prevented from being at the Convention because of illness. Miss Davies attended her first convention in Montreal in 1926 and each successive meeting through 1947.

At the annual business meeting on Tuesday morning, the Convention adopted by acclamation the following resolution:

"Miss Beulah M. Davies, a familiar figure at our annual conventions and at our headquarters in Washington, has been prevented by illness from being with us at this convention: Therefore, be it

"RESOLVED, By the National Crushed Stone Association assembled at its Thirty-first Annual Convention at the Netherland Plaza Hotel in Cincinnati, Ohio, on January 26, 27, and 28, 1948, that we have missed her kindly and helpful presence and send her the assurance of our gratitude and regard, our sympathy, and our hope for her speedy recovery."

Tribute Paid to Manufacturers' Division On Its 25th Anniversary

At the General Luncheon on Wednesday, sponsored by the Manufacturers' Division, J. B. Terbell, Chairman of the Division announced an unscheduled event on the program of such historical interest that the part of the proceedings pertaining thereto is reported in full as follows:

"CHAIRMAN TERBELL: As the first speaker at this luncheon I should like to ask your indulgence in calling on Mr. Graves. I am sure that no introduction is necessary as we all know him as a Past President, member of the Executive Committee, and one of the leading lights of our industry. Mr. Graves!

"MR. OTHO M. GRAVES: I am not one of the speakers. You have only one scheduled speaker today, but this occasion is so significant in our history that your Chairman felt that its importance might appropriately be emphasized to you.

"Once upon a time—fairy stories generally start that way, and this is somewhat of a fairy story—in the year 1923 a group of six men sat around a table in the Hotel LaSalle, Chicago. At that meeting was born the Manufacturers' Division. If you observed the year I mentioned, it is immediately obvious that this is the twenty-fifth birthday of the Manufacturers' Division—and I think that is worth noting.

"At that table were Nelson Greensfelder, who was perhaps the prime mover in the formation of a Manufacturers' Division, C. G. Buchanan, W. E. Farrell, and Nathan C. Rockwood.

"Also, H. E. Gracely, who is now the President of the Marion Power Shovel Company, and Tom Robbins, who at that time was the President of the Robins Conveying Belt Company, now Hewitt-Robins, Inc.

"We had associate members prior to that time but we had no formal instrumentality through which they might work in their own interests and in the interests of the National Crushed Stone Association. It was at that time that the Division was formed.

"They passed a resolution which I think so clearly portrays the spirit with which they were motivated that it is worth reading at this time:

" 'Whereas, the manufacturers of machinery and materials are vitally interested in the problems of the National Crushed Stone Association; and

" 'Whereas, the companies which have already become associate members of the National Crushed Stone Association realize and appreciate the opportunity of cooperation with producers of crushed stone which such membership affords: Therefore be it

" 'RESOLVED, That the officers and members of the Manufacturers' Division (which had just that moment been organized) of the National Crushed Stone Association hereby pledge themselves to vigorously assist the Membership Committee of the National Crushed Stone Association (the National Crushed

Stone Association had at that time just appointed its first Membership Committee) in securing additional active and associate members, and hereby instructs the officers of the Manufacturers' Division to meet with the members of the Membership Committee as well as the officers of the Association, itself, to lay out a plan of action for a membership drive during the coming year.'

"The Manufacturers' Division, Mr. Chairman and members, has been of inestimable value to this Association in so many different ways that I am not going to try to enumerate them—but beyond the splendid expositions which you give to us, there are so many other ways.

"You will perhaps recall, of the names of the men that I have read, Mr. Greensfelder and Mr. Buchanan are the only two of the original group of six who are no longer with us. Mr. Greensfelder was elected the first Chairman, Mr. Farrell the second Chairman, and sometime later, I believe in 1936, Mr. Buchanan became your Chairman.

"Even though, Mr. Chairman, I depart for a moment from that which you asked me to do, I cannot resist saying, it seems to me most appropriate and very delightful that the son of W. E. Farrell, Cott Farrell, has on the occasion of its 25th Anniversary been elected to the Chairmanship of this Division. I cannot help but say, Cott, that if you live up to the efficiency and courtesy of the retiring Chairman, you will have done a good job.

"I think that all the active members, all the producers of crushed stone, all the producers of agricultural limestone, exclusive now of the Manufacturers' Division, but all active producers, should at this time stand up and pay tribute, through their applause, to this Division. Will you do that?

" (The audience arose and applauded.)

"CHAIRMAN TERBELL: Thank you, Mr. Graves, for your nice compliment and lovely speech.

"In this connection, we have a letter here from W. E. Farrell, to whom Mr. Graves referred, and I would like to take this occasion to read it:

" 'Accept my congratulations on this, your twenty-fifth anniversary. I wish Mr. Greensfelder, who so ably conducted this organization and its successful growth, were privileged to observe it today. May the close and friendly relations between you and the National Crushed Stone Association grow in the future as it has in the past.

" 'Sincerely,

" 'W. E. FARRELL, Chairman,
Easton Car and Construction Company.' "

Ed Lewis Sends Greetings

A welcome interruption to the regular order of business took place at the opening session of the Convention on Monday, when M. L. Jacobs, Vice President of the Bethlehem Steel Company, asked for recognition to deliver a message from one of the oldest friends of the National Crushed Stone Association. On being recognized by the Chair, Mr. Jacobs said, "I called on your old friend, Ed Lewis, the other day before I started out and he said, 'I suppose you are going to Cincinnati.' I told him that I expected to and he said, 'I wish you would just deliver this message to the boys for me. Tell them that I still love them, I wish I could be there, and God bless all of them.' " (Applause)

Cott Farrell Elected Chairman Of Manufacturers' Division

The annual business meeting of the Manufacturers' Division was held at luncheon on Tuesday, January 27, 1948, with the gratifyingly large number of approximately 160 in attendance.

Cottrell Farrell, President of the Easton Car and Construction Company, was unanimously elected Chairman of the Division and in addition the following were elected to office as indicated:

VICE CHAIRMEN

Irwin F. Deister, Deister Machine Co., Fort Wayne, Ind.

R. C. Johnson, Simplicity Engineering Co., Durand, Mich.

J. Craig McLanahan, McLanahan & Stone Corp., Hollidaysburg, Pa.

L. C. Mosley, Marion Power Shovel Co., Marion, Ohio

C. H. Roberts, Traylor Eng. & Mfg. Co., Allentown, Pa.

J. A. Trainor, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

BOARD OF DIRECTORS

E. C. Anderson, Kensington Steel Co., Chicago, Ill.

D. McM. Blackburn, Hendrick Mfg. Co., Carbondale, Pa.

A. E. Conover, Robins Conveyors Division, Hewitt-Robins Inc., Passaic, N. J.

L. A. Eiben, Northern Blower Co., Cleveland, Ohio.

S. S. Ellsworth, Ensign-Bickford Co., Simsbury, Conn.

R. F. Feind, Allis-Chalmers Mfg. Co., Milwaukee, Wis.
C. O. Friend, Norberg Mfg. Co., Milwaukee, Wis.
J. Harper Fulkerson, Cross Engineering Co., Carbondale, Pa.
E. J. Goes, Koehring Co., Milwaukee, Wis.
E. M. Heuston, Bucyrus-Erie Co., South Milwaukee, Wis.
C. S. Huntington, Link-Belt Co., Chicago, Ill.
John M. Jeffries, Atlas Powder Co., Wilmington, Del.
W. W. King, W. S. Tyler, Co., Cleveland, Ohio.
Kenneth Lindsay, Iowa Mfg. Co., Cedar Rapids, Iowa
B. R. Maloney, E. I du Pont de Nemours & Co., New York, N. Y.
R. M. Murdock, Frog, Switch & Mfg. Co., New York, N. Y.
Milo A. Nice, Hercules Powder Co., Wilmington, Del.
F. O. Reedy, Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y.
W. A. Rundquist, Pioneer Engineering Works, Inc., Minneapolis, Minn.
J. B. Terbell, American Manganese Steel Division, American Brake Shoe Co., New York, N. Y.
F. B. Ungar, Ludlow-Saylor Wire Co., St. Louis, Mo.
R. E. Wiley, American Cyanamid Co., New York, N. Y.
Roy Wills, Lima Shovel & Crane Division, Lima-Hamilton Corp., Lima, Ohio.
W. A. Wirene, General Electric Co., Schenectady, N. Y.

To Serve on Board of Directors of NCSA

Cottrell Farrell, Easton Car and Construction Co., Easton, Pa.
R. C. Johnson, Simplicity Engineering Co., Durand, Mich.
J. B. Terbell, American Manganese Steel Division, American Brake Shoe Co., New York, N. Y.

Presentation of Safety Awards

Presentation of the safety awards to the winners of the NCSA Safety contest for 1946 was made at the general session of the Convention held on Tuesday morning with W. S. Weston, Jr. presiding. The presentation ceremonies are recorded in full below:

"Chairman Weston: The National Crushed Stone Association Safety Contest, during the years since its establishment, has done much to promote accident prevention throughout the crushed stone industry and it is highly appropriate that public recognition be given on our convention program to member companies accorded meritorious distinction in this contest. At this time we will have the presentation of the National Crushed Stone Association Safety Awards by F. J. Buffington, Chairman, Cement and Quarry Section, National Safety Council, and Safety Engineer, New York Trap Rock Corporation, New York, New York. Mr. Buffington!

"Mr. F. J. Buffington: Mr. Chairman and members of the National Crushed Stone Association: For the year 1946, 54 quarries and mines enlisted in the safety competition sponsored by the Association, and the men in those mines and quarries worked a total of nearly 7-1/3 million man-hours. That is quite a few man-hours! We estimate that probably 4000 men participated, and out of these 4000 men, about 10 per cent, or 400, working in 11 quarries and 1 mine did an outstanding job in accident prevention. Not one of them lost time because of an accident.

"These men were not 'pencil pushers,' and they were not doing a softie's job. They were hard-working men, doing hard rock work. We know that sort of thing offers plenty of chance for a man to get hurt, but in spite of the hazards, 11 quarries and 1 mine worked close to 850,000 man-hours without an accident causing lost time—something to be very proud of, indeed.

"I salute these men, every one of them, and I salute their representatives who are here today to receive the awards to which they are entitled, and I salute the managements that are responsible for such a splendid job.

"The records of these 11 plants were perfect. It was impossible to do better, but there is only one bronze plaque to be awarded and that goes to the quarry which worked the greatest number of man-hours. There has to be some method of distinguishing the one to whom the award shall be made.

"This quarry was the Le Roy Quarry of The General Crushed Stone Company at Le Roy, New York, and to it goes the bronze plaque furnished by The Explosive Engineer magazine, which is sponsored by the Hercules Powder Company. The employees in that quarry, of which J. D. Hawthorne is Superintendent, worked 110,850 man-hours without a lost-time accident. This is the first time they have won the bronze plaque, but they have turned in injury-free records for the years 1934, 1936, 1938, 1940, and 1943—five years plus the year 1946. They richly deserve this recognition of their effort in accident prevention. In the absence of Mr. Hawthorne will Merl

Price please come forward to receive the trophy? You are to be congratulated very much.

"We will now present certificates to the other winners. Will the following men, as I call their names, come forward so that we may present these parchment replicas of the quarry scene on the plaque to each one?

"The following plants won honorable mention, which means that they had accident-free records but their man-hours were slightly less than those of the plant that won the plaque:

"The J. E. Baker Company had the following three plants winning honorable mention:

"Ohio Dolomite Quarry, Millersville, Ohio, worked 110,155 man-hours without a lost-time accident. Roy L. Jacoby, Safety Engineer, will receive the parchment replica.

"The Inwood Limestone Quarry, Inwood, West Virginia, worked 86,978 man-hours without a lost-time accident. N. B. Sipe, Safety Engineer, will receive the award for that quarry.

"Blue Mount Trap Rock Quarry, Blue Mount, Maryland, worked 79,055 man-hours without a lost-time accident, and Roy L. Jacoby will receive the award for that plant.

"The Bakerton Limestone Mine of The Standard Lime and Stone Company, at Bakerton, West Virginia, worked 81,319 man-hours without a lost-time accident. F. C. Thomas, General Superintendent, will receive the award on behalf of this plant.

"Marquette Limestone Quarry, of the Marquette Cement Manufacturing Company, Cape Girardeau, Missouri, worked 70,098 man-hours without a lost time accident. If there is someone here to receive this award, will he come forward?

"The Winchester Trap Rock Quarry of The General Crushed Stone Company, Winchester, Massachusetts, worked 69,354 man-hours without a lost-time accident. William M. Lunan, Superintendent, will receive the award on behalf of his plant.

"Union Furnace Limestone Quarry of the Warner Company, Tyrone, Pennsylvania, worked 57,822 man-hours without a lost-time accident. G. I. Purnell will receive the award.

"The New Haven Trap Rock Company had the following two plants winning honorable mention:

"Plainville No. 4 Trap Rock Quarry, Plainville, Connecticut, worked 57,690 man-hours without a lost-time accident; and the Middlefield No. 1 Trap Rock Quarry, Middlefield Connecticut, worked 49,822 man-hours without a lost-time accident. Fred Edwards will receive the awards for these two plants. Mr. Edwards is the General Superintendent.

"The No. 4 Trap Rock Quarry of the Southwest Stone Company, at Knippa, Texas, worked 46,497 man-hours without a lost-time accident, E. O. Jones, Superintendent. W. F. Wise, the President of the company, will receive the award on behalf of this plant.

"The Millerdale Limestone Quarry of the Waterloo Dredging Company, Waterloo, Iowa, worked 28,350 man-hours without a lost-time accident. E. H. Matthias will receive the award on behalf of this plant.

"(Accompanied by applause the parchment awards were then presented to the representatives of the winning plants.)

"My part of this occasion is supposed to end right here but I am going to take a few more moments of your time. I have been going over the records of the accident-prevention program of this Association for the last twenty-six years, and, gentlemen, it is not good. Do you realize that during the years since 1926, the period for which records have been kept, 78 men have been killed? Do you realize that in the last eleven years 35 men have been killed? That is nothing to be proud of.

"The next question is, What can you do about it? What can we do about it? And next, What will we do about it? I think it is high time that we got together and did something about it.

"I am convinced that if management gets back of this matter, we will get results—and management means the big boy at the top and it means everybody under him, particularly the superintendents and the foremen. I will say, we—and I am not part of management but I am going to ally myself with them just for the moment—will not get safety performance unless we do get behind it.

"I am also convinced that an accident-prevention program can bring results in better understanding between management and employees, a better plant from an operating standpoint and more profits. That may sound cockeyed, but I believe I could convince any man here that with proper care, proper attention given to the matter of accident prevention, he can get somewhere. Thank you."

Report on 3rd Annual Convention of the Agricultural Limestone Division

PRODUCERS of agricultural limestone, numbering over 250 and representing nearly all the states in which agricultural limestone is produced, attended a most successful 3rd Annual Convention of the Agricultural Limestone Division of the National Crushed Stone Association at the Netherland Plaza Hotel in Cincinnati, Ohio, on January 29 and 30, 1948. That these annual get-togethers are of great value to members of the Division is evidenced by the fact that the number who attend keeps increasing substantially each year. The excellence of the speakers and the marvelous exposition of machinery and supplies served as double drawing cards this year.

Kelly Chalk Talks

Tom Kelly was the speaker at the well-attended Greeting Luncheon. Everyone thoroughly enjoyed his most interesting story on soil conservation and the unique manner in which he tells it by illustrating his points with chalk as he goes along. He stated that there remain only about 2.5 acres of cropland for each person in the United States and that the Nation is getting conservation conscious none too soon.

Throughout the two days of the convention much interest was exhibited by producers in the selling and promotion of agricultural limestone. Judd C. Benson's talk on "Your Sales Philosophy is Important" inspired thinking along sales lines. He stated that if he were not engaged in the insurance business, he could think of no other business he would rather be engaged in than that of selling and supplying the minerals, such as limestone, which have been so seriously depleted from our soils.

Much Variety in Friday Program

The program on Friday was opened by an excellent talk on soil improvement in Kentucky by Wm. C. Johnstone, Field Agent in Agronomy at the University of Kentucky. He talked on "The Place of Limestone in the Kentucky Soil Improvement Program" and illustrated his talk throughout with a series of colored slides of farm scenes to emphasize his points.

The story of the many years of research findings at the Agricultural Experiment Station at Wooster, Ohio, with respect to liming Ohio soils was most interestingly related by Robert E. Yoder, Principal Agronomist at that Station. He presented data, which have been collected over a period of many years, that conclusively prove the importance and profitableness of carrying out a regular liming program. He stated that it requires about 300 pounds of limestone each year to replace that which is lost through cropping and leaching.

Dr. C. E. Brehm, Acting President of the University of Tennessee, gave a most thought-provoking talk entitled "What Is Ahead for the Farmer." He stated that with our present knowledge of soil-management practices, disease and insect control, livestock and poultry husbandry, and with the help of modern labor-saving farm equipment, farming in the future will be much more lucrative and satisfactory than it has been in the past.

Assistant Secretary of Agriculture Talks at Luncheon

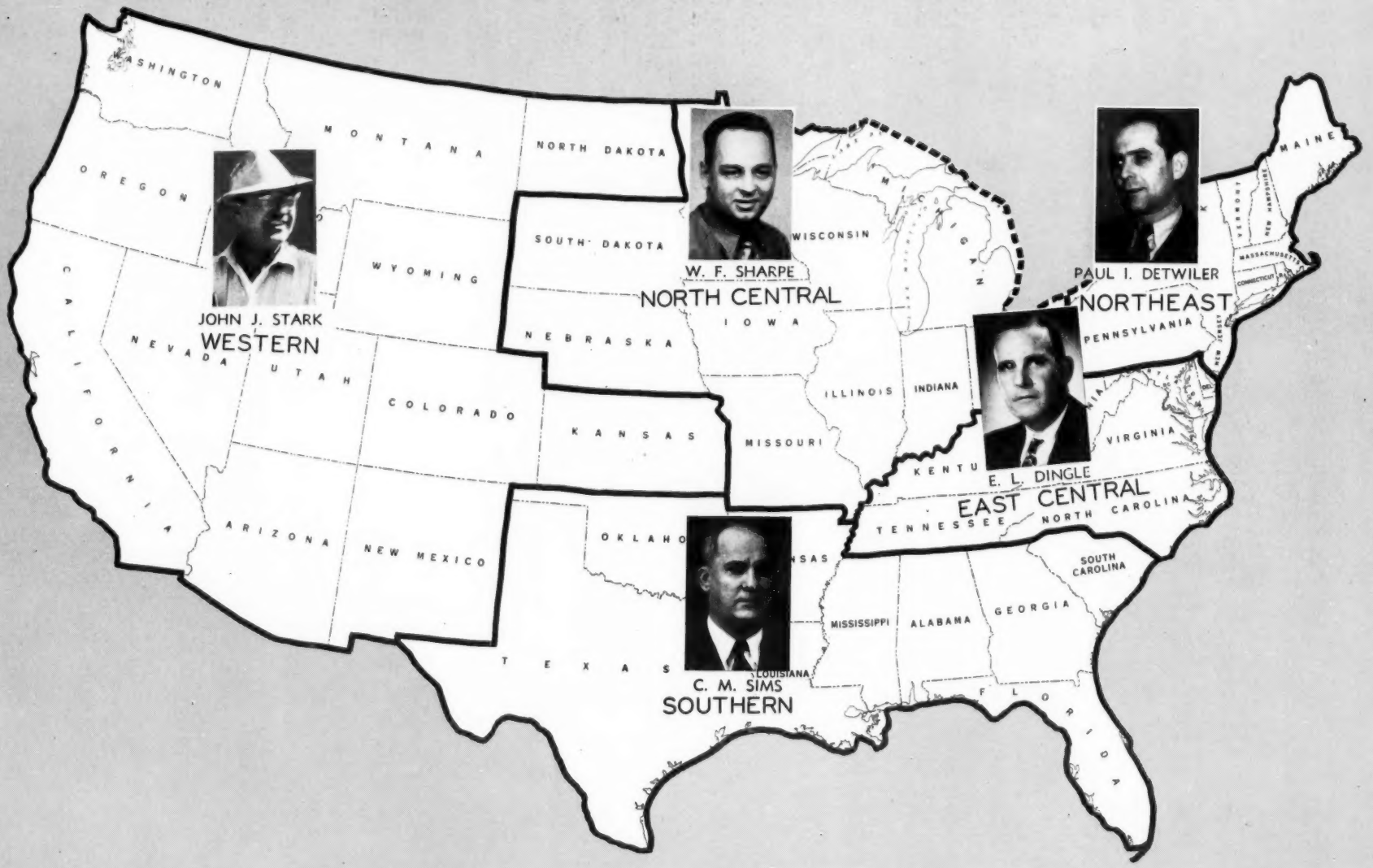
The high light of the general luncheon on Friday was the address by Charles F. Brannan, Assistant Secretary of Agriculture. Mr. Brannan explained the things which the experts at the United States Department of Agriculture consider necessary for a sound long-range farm program. He stressed the fact that all our agricultural wealth springs from the soil and emphasized the importance of restoring and conserving it by applying limestone and fertilizers, growing cover crops, terracing, contouring, etc.

Following the luncheon, Robert H. Engle, Agronomist of the National Fertilizer Association, related the experience his association has had with educational movies. He stated that their movies had been seen by 1,750,000 people at a total cost of 3 cents per person. He showed one of these pictures, "Hunger Signs," to illustrate the type of documentary film his organization has used so successfully. This was followed by a discussion from the floor which resolved itself into a determination to ascertain the interest of members and to develop a method of financing a motion picture on liming.

Officers, Directors Elected; H. C. Krause New Chairman

At the annual business meeting the Nominating Committee, of which W. F. Sharpe was chairman, presented the name of H. C. Krause, President, Columbia Quarry Co., St. Louis, Mo., in nomination for

MAP SHOWING REGIONS AND REGIONAL VICE CHAIRMEN FOR 1948
AGRICULTURAL LIMESTONE DIVISION
National Crushed Stone Association



H. C. KRAUSE, *Chairman*
Columbia Quarry Co.
St. Louis, Mo.

A. K. HAUSMANN
Kelley Island Lime & Transport Co.,
Cleveland, Ohio
North Central Region

P. E. HEIM
Carbon Limestone Co.,
Youngstown, Ohio,
North Central Region

EXECUTIVE COMMITTEE

of the

AGRICULTURAL LIMESTONE DIVISION

of the National Crushed Stone Association

elected by the Board of Directors at its meeting in Cincinnati, Ohio, January 30, 1948

R. P. IMMEL
American Limestone Co.,
Knoxville, Tenn.
East Central Region

S. P. MOORE
Concrete Materials and Construction Co.,
Cedar Rapids, Iowa
North Central Region

RUSSELL RAREY
Marble Cliff Quarries Co.,
Columbus, Ohio
Representing the National Crushed Stone Association

JOHN R. RICE
Liberty Limestone Corp.,
Buchanan, Va.
East Central Region

JOHN H. RIDDLE
Riddle Quarries, Inc.
Marion, Kansas
Western Region

E. V. SCOTT
Southwest Stone Co.
Dallas, Texas
Southern Region

NEWLY ELECTED MEMBERS OF THE BOARD

J. L. FAY
Material Service Corp.,
La Porte, Ind.

C. P. HAUN
Franklin Limestone Co.,
Nashville, Tenn.

H. M. HUBBARD
Willingham-Little Stone Co.,
Atlanta, Ga.

B. G. LINDENFELD
Terminal Materials Co.,
St. Joseph, Mich.

R. E. MESHBERGER
Meshberger Stone Co., Inc.,
Columbus, Ind.

Chairman of the Division for the ensuing year. In making this nomination Mr. Sharpe said, "We have picked a man to submit to you for the job who we feel is very well qualified. He represents one of the finest firms in the business and he is a man who has given unselfishly of his time and resources over the past two years since this Division was organized."

In accepting the chairmanship Mr. Krause complimented his predecessor, S. P. Moore, on the wonderful job he had done during the past two years. He further stated, "We are faced with a lot of problems, and I am going to lean heavily on the membership, the Directors, and the Executive Committeemen for assistance."

Nominations for the 5 regional vice chairmen and 29 directors were presented by the Nominating Committee and unanimously elected, thereby making the roster of the complete Board as follows:

BOARD OF DIRECTORS

H. C. Krause, *Chairman,* Columbia Quarry Co., St. Louis, Mo.

NORTHEAST REGION

Ellwood Gilbert, *Vice Chairman,* New Castle Lime and Stone Co., New Castle, Pa.

H. E. Battin, Jr., Callanan Road Improvement Co., South Bethlehem, N. Y.

Otho M. Graves, General Crushed Stone Co., Easton, Pa.

R. H. Nolan, Nolan Stone Co., Prospect, N. Y.

EAST CENTRAL REGION

Earle L. Dingle, *Vice Chairman,* Harry T. Campbell Sons' Corp., Towson, Md.

S. B. Downing, Jr., Central Rock Co., Lexington, Ky.

C. P. Haun, Franklin Limestone Co., Nashville, Tenn.

R. P. Immel, American Limestone Co., Knoxville, Tenn.

A. W. McThenia, Acme Limestone Co., Fort Spring, W. Va.

John R. Rice, Liberty Limestone Corp., Buchanan, Va.

F. G. White, M. J. Grove Lime Co., Stephens City, Va.

NORTH CENTRAL REGION

W. F. Sharpe, *Vice Chairman,* Dillon, Sharpe & Co., Columbus Junction, Iowa

W. L. Bryan, Bryan Construction Co., Northfield, Minn.

J. L. Fay, Material Service Corp., La Porte, Ind.

A. OVERGAARD
A. Overgaard Rock Products
Elroy, Wis.

N. F. SCHWARZ
Pontiac Stone Co.,
Decatur, Ill.

WM. J. STOFFEL
Dolese & Shepard Co.,
Chicago, Ill.

F. G. WHITE
M. J. Grove Lime Co.
Stephens City, Va.

A. K. Hausmann, Kelley Island Lime & Transport Co., Cleveland, Ohio
L. W. Hayes, L. W. Hayes, Inc., Kansas City, Mo.
P. E. Heim, Carbon Limestone Co., Youngstown, Ohio.
W. E. Hewitt, E. St. Louis Stone Co., E. St. Louis, Ill.
Ed. J. Leary, Ed. J. Leary Construction Co., River Falls, Wis.
B. G. Lindenfeld, Terminal Materials Co., St. Joseph, Mich.
R. E. Meshberger, Meshberger Stone Co., Inc., Columbus, Ind.
S. P. Moore, Concrete Materials & Construction Co., Cedar Rapids, Iowa
Paul M. Nauman, Dubuque Stone Products Co., Dubuque, Iowa
A. Overgaard, A. Overgaard Rock Products, Elroy, Wis.
W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill.
N. F. Schwarz, Pontiac Stone Co., Decatur, Ill.
R. M. Seifried, National Lime and Stone Co., Findlay, Ohio
W. J. Stoffel, Dolese & Shepard Co., Chicago, Ill.

SOUTHERN REGION

C. M. Sims, *Vice Chairman*, Campbell Limestone Co., Gaffney, S. C.
H. M. Hubbard, Willingham-Little Stone Co., Atlanta, Ga.
W. M. Palmer, Dolomite Products, Inc., Ocala, Fla.
E. V. Scott, Southwest Stone Co., Dallas, Texas

WESTERN REGION

John J. Stark, *Vice Chairman*, Girard, Kans.
John H. Riddle, Riddle Quarries, Inc., Marion, Kans.

REPRESENTING THE NATIONAL CRUSHED STONE ASSOCIATION

Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio

New Board Elects Executive Committee

Late Friday afternoon the newly elected Board of Directors held its first meeting and, in addition to approving the budget for 1948 and transacting other business, it elected an Executive Committee for the ensuing year composed of the following members:

A. K. Hausmann R. P. Immel John R. Rice
P. E. Heim S. P. Moore John H. Riddle
E. V. Scott

Also included on the Executive Committee, as ex officio members, are H. C. Krause, Chairman of the Division, and Russell Rarey, representing the National Crushed Stone Association. In accordance with the By-Laws, S. P. Moore and P. E. Heim were elected by the Board to serve with Chairman Krause on the Board of Directors of the National Crushed Stone Association. J. R. Boyd was re-elected Secretary-Treasurer.

AGRICULTURAL LIMESTONE DIVISION GREETING LUNCHEON, 3RD ANNUAL CONVENTION, CINCINNATI, OHIO, JANUARY 29, 1948

New Headquarters Building of the National Crushed Stone Association[1]

EVERY member of this Association should take the first opportunity to visit the new offices and laboratory to see for themselves the very splendid plant which we now own. It is a thing to be very proud of and a great deal of credit and thanks should go to the Building Committee and the members of our staff who planned it and carried it through to completion under very unfavorable circumstances.

The new building is situated at 1415 Elliot Place, N.W., Washington 7, D. C. This is a very suitable location in a very good neighborhood and is a far cry from the dark and dingy second floor at the old address where it was unpleasant to go at any time and unsafe for the staff after dark. The new address is only about fifteen minutes by taxi from the center of town. There is a bus line and a street car line which pass about a block away. For those who go by motor there is ample parking space on our own grounds or on adjacent streets.

The offices and laboratory are housed in a steel and concrete building with a total floor space of 6500 square feet. The building may be entered from either of two street levels. The offices which are mainly on the second floor and are entered from the upper street level occupy 3000 square feet including storage space in the attic. The street entrance is very attractive. (Figure 1) It opens into a large room containing the desks of the secretaries and the files in steel filing cabinets. The decorations are simple but attractive. Off from this room on one side are four doors leading to the individual offices of the Administrative Director, the Engineering Director, the Field Engineer and the Director of the Agricultural Limestone Division. The impression created on viewing this interior is one of an efficient and well run business office. (Figures 2, 3, and 4)

On the side of the room opposite the private offices is the mailing room in which are located the mimeograph machine, the addressograph machine, and the supplies that are necessary to this work. (Figure 5)

Down the stairs from the office floor level is a conference room, laboratory office and drafting room. (Figure 6)

Up the stairs from the office floor level is a room being used to good purpose for storing in racks extra copies of the issues of THE CRUSHED STONE JOURNAL, Useful Information Bulletins and other papers and periodicals for reference. This room provides ample additional storage space for stationery, old files not required for ready reference and the like. There are convenient toilet and wash room facilities, locker space, and a small kitchen equipped sufficiently to enable the staff to cook their own hot lunches if they so desire.

Opposite the entrance door and to the right is the stairway leading to the laboratory. As previously stated, the laboratory may be entered also from the lower street level, a great convenience in the handling of samples and the disposal of the residue after making tests.

The laboratory itself occupies approximately 3500 square feet of floor space. It is equipped for making all of the ordinary routine tests on stone for construction purposes, for making concrete investigations, and for research in bituminous concrete. The laboratory consists of a large room in which are located most of the testing machines including the circular track, a moist room, a room for crushing, screening and the noisy type of testing, a boiler room from which heat is provided for the entire building, and a wash room with shower facilities.

Being on the ground floor all the testing machines have been set up on concrete foundations and thus their operation does not cause any undue disturbance throughout the rest of the building. Our Engineering Director has planned the arrangement of the machines with great care. There is ample space between one machine and another such that the use of one does not prevent the use of another at the same time.

The whole laboratory is well lighted and airy, and altogether a very pleasant place of its kind in which to work.

Just a few feet across the way from the lower level entrance to the laboratory and within the plot of land which we own are situated a number of unheated garages which are joined together to form one building and altogether cover about 1000 square feet of floor space. (Figure 7) This space is ideal for the storage of newly received samples and temporarily unused materials and equipment.

[1] Report of the Executive Committee, submitted by Stirling Tomkins on behalf of the Committee, to the Board of Directors at its meeting held at the Netherland Plaza Hotel, Cincinnati, Ohio, on January 25, 1948.

A knowledge of the principal items of equipment used in the laboratory is important to a full appraisal of our establishment and you will find in Appendix A a list of the machines and a brief description of each furnished by our Engineering Director.

In conclusion, the Executive Committee wishes and urges as many members who possibly can to visit and inspect the new building, not only for your own information, but in order that you may convey to engineers everywhere in government departments and private organizations the fact that we have not only an able staff to help them solve their problems but also the facilities and equipment to enable them to do an accurate, thorough and comprehensive job. In short, we as an association with a policy of betterment of our industry through research and the dissemination of information resulting from research, are now most excellently equipped to accomplish our objectives.

APPENDIX A
LABORATORY EQUIPMENT

The equipment in the National Crushed Stone Association laboratory includes four types of testing equipment, as follows:

1. Rock Testing Equipment
2. Concrete Testing Equipment
3. Bituminous Concrete Testing Equipment
4. Crushing and Screening Equipment

Rock Testing Equipment
(Figures 8 and 9)

This consists of the Deval Abrasion Machine, Los Angeles Abrasion Machine, Dorry Hardness Test, Standard Toughness Test, and a molding machine for cementing value briquettes, diamond core drill and diamond saw.

Deval Abrasion Machine

The Deval Abrasion Machine was originated in the French School of Roads and Bridges many years ago and is used for determining the abrasion resistance of road-building rock. It was originally designed for use with macadam stone and is rapidly being superseded by the Los Angeles Abrasion Test.

Los Angeles Abrasion Machine

The Los Angeles Abrasion Machine is a cylinder 28 in. in diameter and 20 in. long, having a radial shelf 4 in. wide extending throughout the entire length of the drum. The drum is rotated at a speed of from 30 to 33 rpm., and 500 revolutions are required to complete the test. A graded sample of commercially produced stone is used, together with a charge of steel shot. This machine is intended for determining the abrasion resistance of rock and is said to simulate service behavior much more closely than the Deval Abrasion Machine.

Dorry Hardness Machine

The Dorry Hardness Machine consists of a revolving steel disk upon which a 25 mm. core drilled from the rock is held under a given pressure and upon which is fed crushed quartz of a given size. Rotation of the steel disk results in a wearing away of the core of rock at a variable rate depending upon the hardness of the rock. The wear resulting after 1000 revolutions of the disk gives an index of the hardness of the rock. This machine determines the resistance of rock to surface abrasion. Unlike the case of the Deval Abrasion Machine or the Los Angeles Abrasion Machine the sample is not subjected to impact, but merely to surface wear. Consequently, the results obtained represent a basic property of rocks; namely, their hardness.

Standard Toughness Test

The Standard Toughness Test is frequently known as the Page Impact Test because it was devised by Logan Waller Page, at one time Director of the then Office of Public Roads. The sample of rock to be tested is a core 25 mm. in diameter and 25 mm. high. The core is mounted on a steel anvil and is subjected to the impact of a 2 kg. hammer falling on a 1 kg. plunger having a spherical end rested on the specimen. The height of fall is increased by 1 cm. after each blow and the number of blows, which corresponds with the final height of the fall bringing about failure, constitutes the toughness of the rock The tougher the rock the greater will be the number of blows required to produce failure. Rocks having high toughness likewise have high compressive strength and high resistance in the Dorry Abrasion Machine and in the Deval Abrasion Machine. Toughness is also one of the basic properties of rocks and the toughness test reveals one of the important properties of rocks for road building and for other structural purposes.

A power driven diamond saw and a diamond core drill are necessary auxiliary equipment used to prepare core specimens for the toughness and hardness tests.

The cementing value of rock dusts is still considered of importance in some localities and the laboratory is equipped with a molding machine for preparing the specimens for this test.

NATIONAL CRUSHED STONE ASSOCIATION NEW HEADQUARTERS

FIGURE 1
Close-up of Entrance on Elliot Place

FIGURE 2
General View of Offices Showing Private Offices of Administrative Director and Managing Director of the Agricultural Limestone Division in Background

FIGURE 4
General View of Offices Showing Files, Entrance Down Steps to Conference Room, and Stairway Leading up to Storage Room

FIGURE 3
General View of Offices Showing Private Offices of Engineering Director and Field Engineer in Background

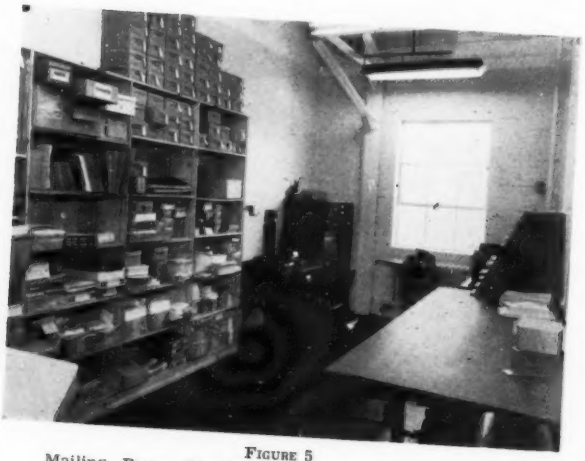


FIGURE 5
Mailing Room Showing Addressograph and Mimeograph Equipment and Assembling Table

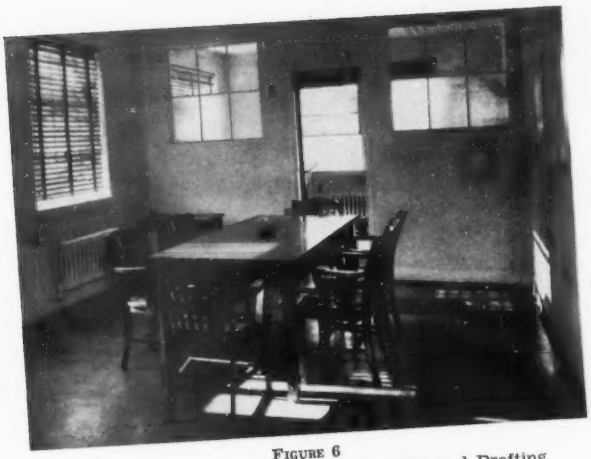


FIGURE 6
Conference Room with Laboratory Office and Drafting Room in Background

FIGURE 9
Los Angeles Abrasion Machine on the Left Encased in a Celotex Cupboard to Reduce the Noise; on the Right a Ro-Tap Sieving Machine

FIGURE 7
Material Handling and Storage Facilities Separated from Research Laboratory by Wide Driveway

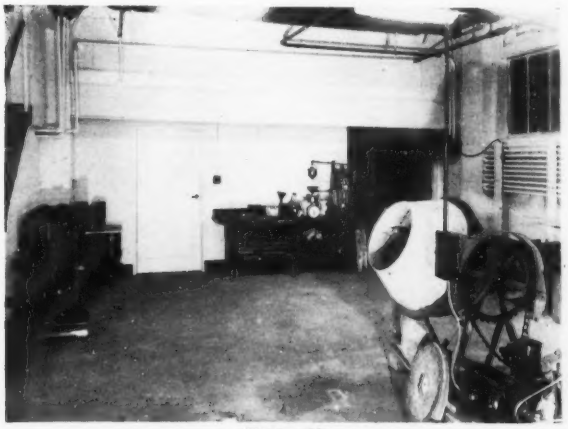


FIGURE 10
Southwest Corner of Laboratory Showing Concrete Mixing and Molding Equipment with Moist Storage Room in the Rear

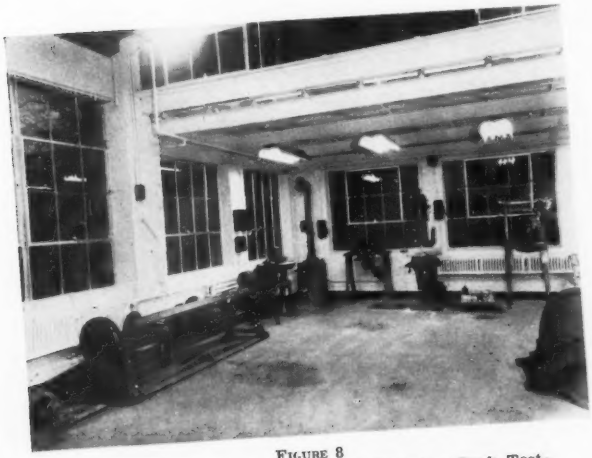


FIGURE 8
Northeast Corner of Laboratory Containing Rock Testing Equipment Including Deval Abrasion Machine, Dorry Hardness Machine, Page Impact Machine, Grinding Lap and Diamond Saw, Diamond Core Drill, and Molding Press for Cementation Specimens

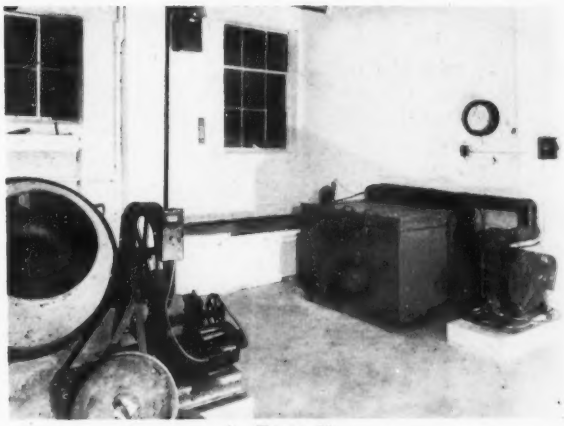


FIGURE 11
Concrete Mixer, Freezing Cabinet and Thawing Tank for Durability Tests of Portland Cement Concrete

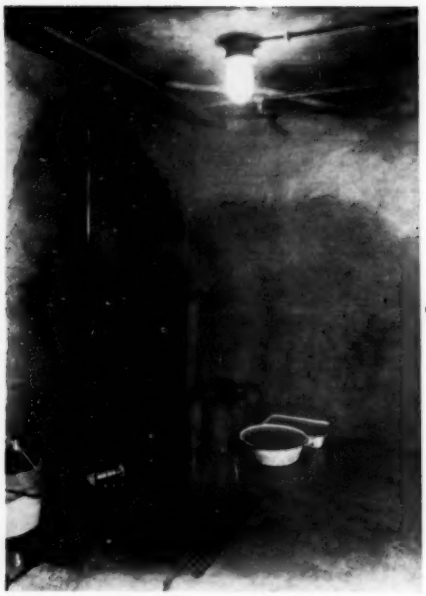


FIGURE 12
One Corner of the Moist Room for Storage of Concrete Test Specimens

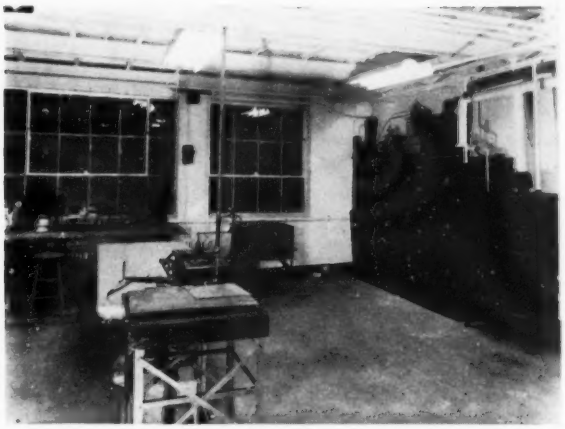


FIGURE 15
Close-up of Southeast Corner of Laboratory Used for Bituminous Testing; Drying Oven with Temperature Control Cabinet in the Corner, Oil Bath Heated Mixing Pan in the Foreground and Constant-temperature Water Storage Tank for Storing Durability Specimens of Bituminous Concrete

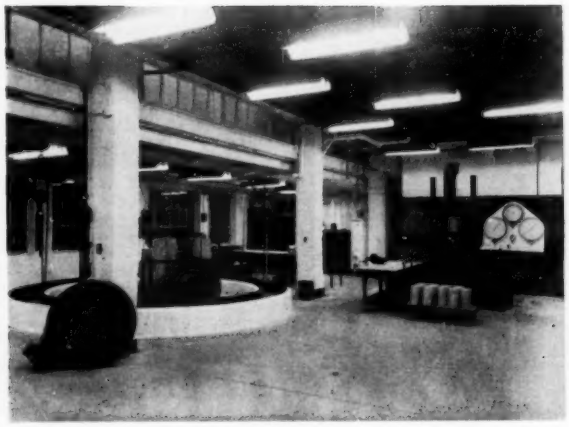


FIGURE 13
General View of Southeast Corner of Laboratory Showing Circular Testing Track in Foreground and 300,000 Lb. Testing Machine on the Right

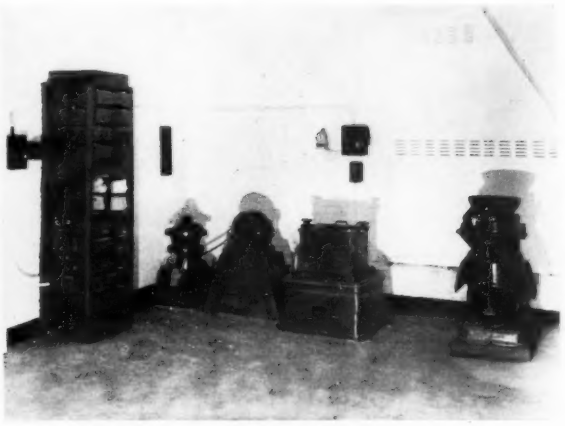


FIGURE 16
Crushing, Grinding and Screening Equipment for Coarse Aggregates. This Room is Provided with Exhaust Equipment for Removing Dust

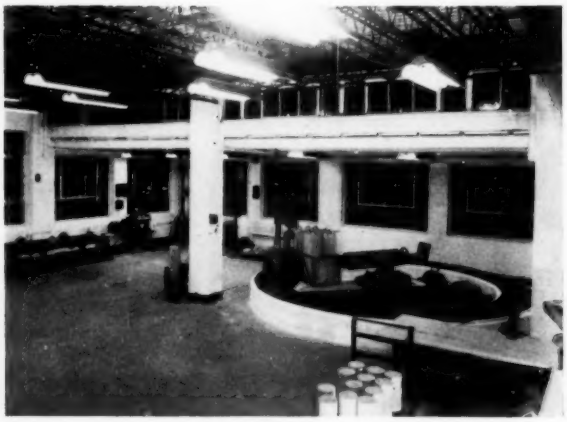


FIGURE 14
General View of Northeast Corner of Laboratory Showing Rock Testing Equipment with Testing Track in Foreground

FIGURE 17
Separate Room for Making Tests of a Dusty and Noisy Nature, Sieving Equipment to the Left and Band Saw for Sawing Concrete in the Center

Concrete Testing Equipment
(Figures 10, 11, 12, and 13)

The laboratory is rather thoroughly prepared for concrete testing with equipment consisting of the following:

1. A 3 cu. ft. "Little Wonder" concrete mixer.
2. A moist closet, thermostatically controlled to produce constant temperature conditions with 100 per cent humidity. Water from a small sump built in the floor of the moist room is circulated by means of a small, shallow well pump and is electrically heated when necessary and cooled by means of a ½ hp. compressor. Mine sprays are used to create the necessary moist condition.
3. A number of 6 by 12 in. cylinders and 6 by 6 by 36 in. beam molds are a portion of the equipment.
4. A freezing cabinet is provided for making accelerated freezing and thawing tests to study the effect of freezing and thawing on concretes of different kinds.
5. The laboratory has a 300,000 lb. Southwark-Emery Testing Machine for determining the compressive strength and beam resistance of concrete. This is a hydraulic machine employing the famous Emery principle for weighing the load.
6. A power driven band saw is used for cutting specimens from concrete for various kinds of tests, such as freezing, volume change, etc.
7. A special vibrating table is used for making specimens by the use of vibration. Likewise, special workability tests are made on this machine.

Bituminous Concrete Testing Equipment
(Figures 14 and 15)

The bituminous concrete testing equipment consists of the following:

1. A bituminous concrete mixing pan, heated by means of an oil bath.
2. A temperature control cabinet in which three different temperatures may be maintained by thermostatic control, used for various kinds of tests on stone and bituminous concrete.
3. Necessary molds for making the compression-immersion test for determining the durability of bituminous concrete.
4. A circular testing track for making simulated service behavior tests on bituminous mixtures in order to determine their durability under wet conditions. The circular track is 14 ft. in mean diameter and the traffic equipment is driven from the center by means of a 3 hp. motor. A rubber tired wheel mounted at the end of a radial arm operates on the track and carries a load of about 2000 lb.

Crushing and Screening Equipment
(Figures 9, 16, and 17)

For making screening tests on both coarse and fine aggregates, the laboratory is equipped with a large "Ty-Lab" mechanical screen and a small "Ro-Tap" sieving machine for testing fine aggregates; likewise, a revolving screen made by the Hendrick Mfg. Co., after designs provided by the late W. S. Weston. A small "Hummer" vibrating screen is available for preparing large samples of coarse, or fine aggregate for use in concrete investigations.

A small crusher of the gyratory type and a small grinding machine are installed for the preparation of aggregates for concrete and bituminous concrete investigations.

For making the necessary measurements the laboratory is also provided with auxiliary equipment; such as a Whittemore Strain Gauge, used for measuring the gain in length of concrete which is affected in the freezing and thawing tests. Any appreciable gain in length indicates that unsoundness of the concrete is to be expected.

A testing bin for making load tests on flexible road surfaces is a portion of the equipment and this is used from time to time as problems present themselves. Soil pressure measuring equipment for determining subgrade pressures due to traffic loads is used in conjunction with the bin.

"Jackhammer Safety"
A New Safety Film

THE prevention of injuries to jackhammer operators in quarries has been a major safety problem in the crushed stone industry for years. The new slidefilm entitled "Jackhammer Safety" is intended to strike hard at this source of accidents.

The film consists of 49 frames emphasizing safe dress, inspection of equipment, and safe and unsafe practices in each step of the jackhammer operator's work. A guide is furnished with each strip which contains suggestions for the meeting and appropriate comments pertaining to each frame in the film.

The price of the film, including the Guide, is $10.00 to members of the National Safety Council and $20.00 to non-members. Copies may be obtained by writing the Cement & Quarry Section, National Safety Council, 20 N. Wacker Drive, Chicago 6, Illinois.

USDA'S Long-Range Farm Program[1]

By CHARLES F. BRANNAN

Assistant Secretary of Agriculture
United States Department of Agriculture
Washington, D. C.

I THINK it is a high privilege to come down here to Cincinnati to this meeting and talk with you folks about a long-range program.

If you followed closely the Chairman of the meeting today in his introduction, you might get the impression that a great deal of responsibility for what the Department has proposed to the Congress these past few months is the work of one individual or the work of some small group of individuals. As a matter of fact, if you got the impression that it was the work of the Department of Agriculture alone you would still be in error. The job that preceded our recommendations to the Congress a few months back was not only the result of a great deal of effort on the part of the review group in the Department; it was the result of the thinking of practically all of the people in the Department.

Our first series of committees with which we started out to formulate our recommendations consisted of over 200 people. Since that time we have submitted our views to the representatives in the many field offices of the Department, to representatives of the land-grant colleges, and to farmers, themselves, clear down to the county level all over this United States. As a matter of fact, at this very time the proposals are under discussion in local agricultural committees, usually referred to as the USDA Council, in every agricultural county of the United States. We hope there are going to be many valuable suggestions for improvement.

Fundamentally, any kind of policy for agriculture is a living, progressing sort of thing, and if we were to take the attitude with respect to an agricultural policy for the United States that we are like the man who can walk into the clothing store and have the clerk hand him down a garment that fits him as to size, suits him as to color, and also suits him as to price—and it has been a long time since we have been able to do the latter—we would not be looking at a long-range program with reality in our vision; because it is a progressive, vital, dynamic sort of thing which is going to grow as this country grows, as our research develops, and as our capacity for using our soil and our knowledge increases.

President Brehm in his address this morning referred to the term "confusion," and he professed to suffer considerably from confusion on a number of scores. Frankly, if he is suffering from confusion, I hope that a considerably larger number of people in this country get the same kind of disease, because those of you who know about Tennessee, the University of Tennessee, those of you who know about the progress of agriculture in Tennessee, those of you who have seen one of those experimental farms or test demonstration farms of which he spoke this morning, know that there has been something else besides what you and I understand as confusion going into them. So, Mr. Brehm, I refuse to accept, and I do not think you intended that we should accept, your term "confusion" in a pessimistic sort of way, because I think it is the last adjective that I would ever use to describe you, or any of the other people who have been great leaders in agriculture, as you have been.

When I talk about an agricultural program this noon, I would like to think that, to the extent you can embrace it, it is your program; to the extent that you can add to it, it is your program; and certainly to the extent that you are an American citizen interested in agriculture, not only in making your livelihood in a contributing business to agriculture, but inasmuch as it is part of your fundamental, basic resource of this nation, you ought to have a genuine, legitimate, and growing and working interest in the subject. So, let's just get down to it now in a few minutes before you resume your regular program.

Why are we talking about a long-range program today? I think, first of all, we have to go back into history just a little way. We remember that during this war our farmers did a lot of things with our agricultural lands. We put teriffic strains on agriculture in this country. The goals set by the farmers themselves, and by those of us who were trying to appraise the needs of our government and the

[1] Presented at the 3rd Annual Convention of the Agricultural Limestone Division, Netherland Plaza Hotel, Cincinnati, Ohio, January 29-30, 1948.

cooperative governments in this war, used up large quantities of the natural mineral and organic material in the soil. As a result, from about 1940 up until the present day (except last year in the case of corn) there was an increase in production of almost every major crop.

A lot of things went into that job: a great deal of fundamental research, which resulted in many improved varieties, such as hybrid seed corn; the research which resulted in DDT, a great insecticide, and which, as you folks know, contributed substantially to the increase in the average yield of many crops over the country; then 2,4-D, the weed killer. So, as we come out of this war we find ourselves also equipped with brand new, excellent machinery, the efficiency of which we never had any vision of a few years back. We find ourselves equipped with all these other new scientific developments and we find ourselves faced with an adjustment to a peacetime need in the not too distant future—peacetime, we hope, certainly, for the long future.

At the same time we also face the need for restoring to our soils, as President Brehm said, the things that have been taken from them. Also we have an increased production. Now we are going to have to figure out what we are going to do with this production. The ultimate objective is to try to bring a working, efficient, economically sound balance between the things and the elements with which we produce food and agricultural products on the one hand, and the consumptive resources of our country on the other.

So, as we started out to talk about an agricultural program, we might say: What are the consumptive resources of this country, and what impact will they have on the future production of the country? And then we say: What are our productive resources and how, in turn, can we bring about a balance?

We did what I think you will find to be a very interesting thing. To begin with we tried to determine the potential consumptive capacity of our people here at home in terms of what people would eat if they had the resources and the money to buy the things they would like to eat.

Without going through the formula, in detail, let me say we just picked out an average individual, with an average income, and through the Bureau of Labor Statistics and our own Bureau of Agricultural Economics, we were able to compute with a reasonable degree of accuracy what that fellow bought for himself and his family when he had a reasonable income and things were available.

It is surprising to learn the things which they eat, and the amounts they desire over and above the things which we are able to produce. These lie in the realm, first of all, of meat, poultry, and other livestock products; second, citrus fruits; third, fresh vegetables and a few other things; and I want you to remember the livestock products particularly because you and I know what kind of land and farming produces livestock.

We also found that our excess production lays in the area of grains, such as wheat, some of the other grains, and commodities which we refer to as the intertilled crops. We think that at the end of the period of time when the war torn parts of the world will be rehabilitated physically, at least to the point where they can produce their own food, we are going to have to find out what we can do with the grain-producing capacity in this country.

You know there are a lot of problems which face this United States from time to time, and some of them look pretty insoluble, but, frankly, and fortunately, it seems to me that right here, in the very essence of the problem, we also have the very essence of an excellent solution, because if you take the things that people want if they have the money to buy them in this United States, you will find that they are the types of things which are grown on the types of agricultural land which we have to conserve in this country. In other words, our pastures must be restored in order to increase our livestock production, and if we are to increase our pastures we have to make those pasturelands out of the intensively operated croplands which we have today.

Out in my State of Colorado, on the eastern side of the State, we were doing, up until the war came along, a pretty good job of soil conservation. We put a lot of land back into cover crops of one type and another. We had begun to stimulate the production of grasses and legumes and some of the other crops, on which we could run substantial herds of livestock, but the war came along, and the demand for wheat in this country, with accompanying increased price, became so great that pretty soon they began to plow up that same land. Just last year, or the year before, there was a gang plow 40 feet wide, cutting up land which, in my humble opinion, never should have been broken. But it produced wheat, and a substantial quantity of wheat.

We are going to have to put that land back into legumes and cover crops soon, and I do not need to say to the agricultural limestone industry anything about how you get it done. You get it done with

phosphate and lime, and therefore, you folks have a very vital and important interest in any long-range program which, as far as I can see, this country is going to have to try to work for in years to come.

I think President Brehm would agree with me that down in his part of the country, one of the most significant of all the developments has been this conversion from intensive cultivation to cover crops and legumes, and the very example that he gave us this morning was typical of that type of conversion.

So, frankly, I feel that here is one problem which faces the American people about which we can have genuine optimism, because the very things that have to be corrected in themselves suggest the correction. In short, as we take our land out of the intensively cultivated types of operation, we put it into the types of land which produce livestock and the other kinds of feed and food which the American people have indicated they would consume more of if they were available.

So, it moves across the calendar, or it moves across the scene of our contemplation, about as simply as this: Much of our land must in the future be taken out of intertilled crops, put into cover crops of one type or another, and at the same time we must increase the production of livestock and many of the other things that grow and flourish on good cover-crop land. In my opinion the solution lies very close to the fertilizer and the limestone industry—as a matter of fact, it lies as close to you as to any other industry which is concerned with farming.

Let's take another look at what lies in the future. Let's say that our exports to Europe, the 500 million bushels of grain or 450 million bushels of wheat which we are going to ship this year, were suddenly cut off—and we had not started this transition (which you folks well know we have) back from the intertilled crops over to the legumes and cover crops; what would be the position of the American farmer? Do any of us think—and I am sure we do not—that the farmer would say, "There is a reduction in demand for our products so we are going to turn back in our methods and plans of operation"? In other words, do you think the fellow who has a good tractor, is going to say to himself, "I am just going to quit using the tractor and go back to mules", because he does not need that tractor for intensive cultivation of grain? Is he going to plant ordinary seed corn instead of hybrid seed corn? Is he going to give up the use of fertilizers or lime or any of the other things which stimulate and bring about production? You just could not ask the American people, or the farmer, to say, "We are going to give up any of our new and improved methods."

We know he is not; therefore, the thing which confronts us today is not how we are going to get rid of surpluses or cut back production, but how we are going to use production in this country and how it can be guided—and I use guided in the true sense of the term, so that the American farmer knows the direction and the lines of production which are most beneficial to him and which are most beneficial to the consumers of this country, and which will keep us a vigorous country prepared to carry out as large a domestic and export program as is efficient.

We have summarized that whole attitude by saying that the policy for American agriculture is organized, sustained, and realistic abundance—abundance of the things that people want; abundance of the things that people can buy and will buy when they have the money to buy them.

So, bringing it down now to the lime and fertilizer business, let's just do a little thinking about it. I suppose all of you are well aware of these figures, and this might be carrying coals to Newcastle, but the average limestone production or use in 1935-39, the prewar average, was about 6½ million tons. It started out somewhere in the neighborhood of 3½ million in 1935, ending around 9 million in 1939, with an average of about 6½ million. We do not have the estimates for 1947 and 1948 yet but they will be ready soon. In 1946 farmers used over four times that, or almost 28 million tons of limestone.

I am sure many of you know of the survey which was conducted just about a year ago, in which, by state and by county and by farm, we attempted, with the aid of the Extension Service and the land-grant colleges, to project how much limestone could and should be needed by farmers in this country, and we came out with a figure close to 51 million tons per year.

As a matter of fact, we are doing a reconsideration of that survey and I think it is possible, or probable, that the results of that survey will show needs for as much as 60 million tons of limestone per year in this country—in other words, 15 to 20 per cent higher than our previous estimate—and therefore the problem comes right back to your doorstep here in this limestone meeting: How are we going to get it to farmers? How are we going to get it to them in the form that they need it most? How are we going to help educate farmers to use it in the proper way, the proper style? If he uses it in an incorrect fashion, then you have lost a customer, and some valuable

land may ultimately be destroyed if he reaches the conclusion from his misuse that the limestone is not good. Therefore, we are faced with intensification of our research, and that, I hope, will go on as it has gone on in many of our colleges over the country. You had a very excellent example of that in Dr. Yoder's talk this morning.

I hope it will go on at Beltsville where it has been going on in consultation with the colleges over the country, and for my part, I hope it will be greatly intensified.

I hope at the same time that the industry will carry on its research: research in production, research in marketing, so that, together with the scientific development that goes on through our experiment stations, the land-grant colleges and the Department of Agriculture, we will have reached a maximum of efficiency in the production, distribution, and use of limestone in this country.

And as and when we do that, we must couple with it other fertilizers, because certainly nobody can stand off and say you can depend on limestone alone. Not one of those charts that Dr. Yoder put up on the screen could lead anyone to believe that you can talk about limestone alone without talking about the other fertilizers—as a matter of fact, without talking about farming practices generally. If we look at the whole picture and try to gear limestone production and its use into the whole picture, then I think we are all making a very substantial contribution.

I said a while ago that the problem was as simple as just using our resources in the fashion in which they produced the types of things and the amounts of things that our people need, and that, really, the great problem was to gear our production, our efficient production, our realistic production, to our consumer demand and our export program. There is one other thing. About 150 or 200 years ago when the first plow struck these lands of ours, we did not have the knowledge and the experience that we have today, so there has been much misuse of our land, and hence our problem with respect to a long-range program includes another thing. It includes not only progressing from here with respect to the intelligent use of our resources, but going back and undoing some of the harm that has been done previously. You sum that up in the term "soil conservation."

The intensification of all types of soil conservation programs, it seems to me, is one of the necessities which warrants the very careful consideration and support of you folks and every other person interested in American agriculture. The limestone industry has an important stake in soil conservation. Frankly, if I may say it, gentlemen, you have a stake in ACP programs and all of the other types of conservation programs which the Department is carrying on from year to year, and which the colleges carry out, and which we annually have to go up and talk with the Congress about from time to time.

As we talk here about projecting ourselves into the future, we must do more than just think about the problem. It is a sort of living thing about which we all have to keep busy and working. We have an educational job to do not only among ourselves but among a lot of other people who have responsibilities to do something about the total national economy.

I think the statement made recently by Chester Davis, President of the Federal Reserve Bank at St. Louis, is about as significant a one as I have heard for a long time. He was talking about agricultural credit for the improvement of land. He said, in effect, that "the time has passed, if it ever existed, when any one man has the right, by reason of his ownership in fee simple title to completely destroy that piece of land by misuse or any device." I think, literally, that is true.

No one who reads history can reach any other conclusion but that some of the great civilizations on this globe failed because they did not know how to use their land. The studies in the Euphrates Valley, the studies in the Nile Valley, indicate to us that the misuse of the soil—and I do not say it in a derogatory sense because they did all they knew to do in those days—led to the complete dissolution and disappearance of those civilizations; and the misuse of the soil in this United States can lose for us the leadership which we now have in the family of nations in this world—not tomorrow, not five years from now or ten years from now, but certainly as inevitably as time goes on.

After all, any country has two principle resources: The resources that come from your soil, those of an organic character and those of an inorganic character, and the people. The inorganic resources, steel, coal and all the rest of the products of our mines, we know are important; but so is the daily food which comes out of our land to keep our people going.

So, we find justification in talking about putting funds into helping people keep their soil fertile, helping them learn how to use it effectively, and learn how to be good farmers so that as they take off a crop this year or the next their ground will remain in as good a condition as it was when they started, and where necessary, will have actually improved in fer-

tility. Because, only if we are progressing in that general direction can you and I as citizens sit back and say that at least on one front we are doing the things which preserve the national interest and the public welfare.

Perhaps, ladies and gentlemen, I get a little enthusiastic when I talk about these things. But, before I stop, I want to say a few words to you about the importance of what we have called the Marshall Plan, or now the European Recovery Program. It bears directly on what we are talking about today. There are a lot of ways to approach that problem. There are some of us who say that we should not be exporting all of this grain to Europe. Perhaps we should not be, but let me ask you a question. Let's say that some community out here a little way, perhaps Indianapolis, was stricken with a great catastrophe of some kind, a great all-consuming fire, many people destroyed, and their water system and all the rest of the things that go to make daily life safe in that community, were destroyed, and somebody came over from that community and said, "Come and help us," and the mayor of this city said to you, "Look, I want you to take on this job." You or I would probably say "I am not an economist, I certainly am not a city manager, I am not any of those things." But the mayor insists. I wonder just what you would do.

I think you or I would do something like this. We would go over to Indianapolis and find out what they needed. We would do the best kind of job possible to find out what they needed, and then we would come back to Cincinnati to find out what we have that they need. From that, we would begin to project some kind of help.

Ladies and gentlemen, it seems to me the Marshall Plan is just that simple. You can argue a lot about whether we ought to do it through the United Nations, or whether we ought to do it direct, and with what kind of organization, whether under the President or the State Department or an independent organization; but there is one difference in the example that I gave here. If we did not take care of Indianapolis under those kinds of circumstances, Indianapolis probably would just fade out of existence. But Europe is not going to fade out of existence. It is going to grow under some kind of government. You and I know that even during this war, the population of all of western Europe increased. There are people there who are going to exist somehow, and if the pressure of existence gets strong enough, they are going to the sources of supply to get it, and if we happen to be the source of supply, then we had better begin to look out.

I could not pass over the opportunity of just pointing out to you that it seems to me the Marshall Plan is just about that simple, and that we are justified in taking some of our soil resources in the form of 450 million bushels of wheat this year and sending them over to them as part of some kind of organized plan of aid and recovery.

Of course, we have also the humanitarian aspect; I do not think most people like to go along and let other people starve to death. I think that is a very cogent argument, but an equally cogent argument is the one of our own welfare.

That is one of the stakes that you have to weigh. It is part of the American economy, it is part of democracy, to weigh those kinds of stakes, and knowing that the only thing you and I can say to ourselves is that, as we participate in the ultimate decision, we hope that we are equipped with sufficient facts and knowledge to do a good job.

In conclusion, I would just like to say this. It seems to me that the future of the limestone industry is tied directly and specifically to the prosperity of the United States. Our consumer capacity in this country is the main criterion by which we will guide our production—guide it in the direction that we want it to go.

I hope we will never see the day when we ask for curtailment in production of agriculture in general. I do not know whether we ever had a policy of scarcity in this country. Many people refer to killing the little pigs as evidence of a policy of scarcity. I do not think we ever had a policy of scarcity. I think all we were trying to do, in a very feeble way, was to adjust our production to our demand, because in the days when we were killing the little pigs, and other production limitations, we were simply trying to keep off of the market the excesses over and above what we knew people were able to purchase in those times.

But call it what you may, I think our policy should be one of abundance, not only as a matter of policy but as a matter of a working objective. If we are to produce what our people want, and what a readjustment of our farm practices demands, it will mean more grasslands, and hence greater increases in the use of limestone. It will require new thinking and a new willingness to follow through and make the changes. If the limestone industry is to play its part and make its major contribution and participate fully

(Continued on Page 32)

The Modern Macadam Pavement[1]

By FRED E. SWINEFORD

Engineer-Director
Macadam Pavements, Inc.
Columbus, Ohio

IN this mechanized world of today stone producers have modernized their plants with new crushers, conveyors and screens to economically produce varied sizes of stone for macadam. Manufacturers of quarry machinery, in the face of steel shortages, have done their best to supply necessary quarry equipment. Likewise road machinery manufacturers are turning out new machinery to lay macadam and road contractors are equipping themselves with these new machines to lay macadam at reasonable costs. Construction specifications and material details, which are now being revised by engineers to recognize machine methods, will be described only briefly here because they are readily available in highway specifications and handbooks. The published reports by the staff of the National Crushed Stone Association cover every phase of materials and methods for the design and construction of macadam.

Since John L. McAdam built his first macadam road in London in 1817 macadam pavements have gone through the hand-laying method, the horse and wagon era, to the machine-laying methods of today. The principle of the macadam pavement which consists of compacted and keyed broken stone has been universally accepted. Over the past 140 years, this method of road-building has proven its worth by carrying traffic of past and present vehicles.

Modern Design

Modern traffic has necessitated wider and thicker pavements but the composition remains the same. This composition consisting of a solid mass of crushed stone compacted and bonded has proven its value as a medium to transmit wheel loads to the subgrade. The principle of design of macadam as a flexible pavement is very simple. The wheel load is transmitted through the macadam and distributed over the subgrade in the form of the frustum of a cone with 45 degree sides. The top of the frustum of the cone is the bearing area of the tire on the pavement and the base of the cone is the area over which the load is distributed on the subgrade. For example, on a truck axle carrying 10 tons one of four tires spreads its load of 5000 pounds over 78 square inches of pavement at 64 pounds per square inch. Then the macadam pavement 10 inches thick transmits the 5000 pound load through the frustum of the cone to an area of 707 square inches on the subgrade at an average of 7 pounds per square inch. Likewise an airplane tire carrying 20,000 pounds spreads its load over 314 square inches of runway and the macadam pavement 20 inches thick transmits the 20,000 pounds to 2,826 square inches of subgrade at an average of 7 pounds per square inch. In both cases the load per square inch on the subgrade is one-ninth of the tire load per square inch on the pavement. Therefore to design the required thickness of a flexible pavement it is only necessary to estimate the expected wheel load and determine the supporting value of the subgrade, then use the 45-degree cone method of distribution to find the required thickness of pavement.

The modern macadam pavement is constructed of one or more courses on a stable subgrade and surfaced with a bituminous wearing course. A typical modern macadam pavement consists of two four- to five-inch base courses of crushed stone with a predominating size between 3½ inches and 1½ inches in size. Each course is keyed and compacted by rolling and then filled with stone screenings applied in several applications. Final compaction and bonding is accomplished by rolling to form a solid mass. Bonding is usually accelerated by adding water during and after filling with screenings. One or more of the base courses may, if desired, be constructed of bituminous macadam by the penetration method using asphalt or tar as a binder.

A layer of 1 to 2 inches of stone screenings placed on the subgrade prior to placing the coarse stone is recommended. This layer of screenings prevents any soft subgrade from being forced up into the coarse stone and helps to fill the lower part of the course.

[1] Presented at the 31st Annual Convention of the National Crushed Stone Association, Netherland Plaza Hotel, Cincinnati, Ohio, January 26-28, 1948.

Upon the two base courses a 3-inch course of 2-inch to 1-inch crushed stone is spread, rolled and compacted for the bituminous macadam wearing course. This course is bound and sealed with hot asphalt, hot tar or asphalt emulsion applied through a distributor spray bar. After each application of bituminous material crushed stone chips are applied to fill, key and surface the course.

Alternate wearing courses may be composed of mixed-in-place or pre-mixed bituminous concrete. For light traffic a bituminous prime and seal covered with stone chips applied directly on the waterbound base will provide an adequate wearing surface.

New Construction Methods

As stated in the beginning, quantities and quality of materials and details of construction will be mentioned only briefly here because they are readily available in specifications and handbooks. Consequently we will devote our time to describing new and successful methods now used.

First the subgrade must be made stable by drainage combined with compaction or by the addition of granular material. Furthermore it must be finished true to the profile and cross-section specified, otherwise irregularities in the subgrade will appear in the finished pavement.

Methods of spreading coarse stone for the courses has made marked progress in the last few years. During the past year I have observed five types of mechanical stone spreaders in use on macadam construction in Ohio. One of these types is the Jaeger Stone Spreader which consists of a steel box carried on two high metal wheels and towed by the truck discharging the stone into the box. This spreader has long metal runners to provide a planing effect in spreading. Another type of stone spreader is the Jaeger self-propelled black top paver which has also been very successfully used to spread macadam stone on several jobs. The Adnun Black Top Paver has been extensively used to spread macadam stone. The Shunk self-propelled stone spreader which is carried on two rubber caterpiller tracks running on the stone course has given very good results. The All Purpose Spreader with traction wheels on the subgrade has been used on several projects.

The Jaeger and Adnun Pavers, the Shunk and the All Purpose Spreader are all self-propelled and push the truck discharging the stone. All of these mechanical spreaders increase production and reduce hand-raking and leveling.

Side forms are not required or necessary where mechanical spreaders are used because these machines spread the stone to a uniform width and thickness. The outer edge of the stone course is confined by either a vertical face of earth cut with a motor grader or by an earth shoulder pulled against the stone. Laying stone without side forms reduces hand labor, increases production and insures uniform width and thickness of the course.

Following the spreading, rolling and keying of the stone, screenings are applied in several applications. Each application is followed by rolling to work the screenings into the voids of the coarse stone. The screenings are almost universally spread by mechanical spreaders attached to the truck. These are either the rotary cylinder type or the spinner type. This is another mechanical development which has come into use in the last decade to reduce hand labor.

Vibration Introduced

Vibration is a new method now being initiated in Ohio to vibrate the screenings into the coarse stone. This method was used on four macadam projects this year. One machine used for vibration consists of a vibrating roll mounted between the front and rear rolls of a tandem roller. The center roll is an idler which can be vibrated at a rate of 3600 pulsations per minute. This machine combines the roller and the vibrating units. On two projects it was observed that 1 to 1½ inches of loose screenings spread on a 4-inch course of macadam stone was vibrated into the course in two passes of the roller. On these two jobs experiments were tried to fill an 8-inch macadam course and it was found that 2 to 3 inches of screenings applied at one time could be vibrated into the course with 3 to 5 passes of the vibrating roller. Ordinarily thick applications of screenings will encrust over the stone but with vibration, examination of test holes showed that the screenings had filled the voids to the subgrade. In both of these cases, the full amount of screenings required to fill the course was spread in only one application and in both cases the entire course was filled by vibrating the one application of screenings; this greatly reduces the number of operations for filling. Three or more applications are usually required.

The other type of vibrator consists of a battery of six vibrating shoes mounted on a frame carried on caterpillar tracks. The machine is propelled by one motor while another motor vibrates the shoes at the rate of 2800 pulsations per minute. Each shoe is 12 x 25 inches and weighs 150 pounds. On two proj-

ects it was demonstrated that by placing the screenings in three applications for a 4-inch course of macadam, one pass of the vibrator after each application of screenings would completely fill the course.

Vibration is not a substitute for rolling but it speeds up the filling operation. Normal rolling is done to key the stone before filling during vibration and after filling. However, the new Ohio Specification will permit the amount of rolling time required during the filling operation to be cut in half when vibration is used.

Choice of Wearing Courses

After the macadam base courses are keyed, filled and bound, they are ready to receive a bituminous wearing course of bituminous penetration macadam, mixed-in-place macadam, a bituminous treatment or a plant-mixed bituminous course. For bituminous peneration macadam, crushed stone of a size from 2 inches to 1 inch is spread by one of the several mechanical spreaders previously described. This course is rolled until firm, true to cross-section and uniform in texture to the usual thickness of 3 inches. Bonding of this course is done by one or preferably two applications of hot tar, hot asphalt or asphalt emulsion by a pressure distributor. For one application, approximately 2.0 gallons per square yard are applied, for two applications 1.2 gallons and 0.8 gallons are generally applied at approximate temperatures of 200 degrees Fahrenheit for tar, 275 degrees Fahrenheit for asphalt and 70 to 110 degrees Fahrenheit for asphalt emulsion. It is important here not to overheat the bitumen lest too much of it goes to the bottom of the course and fails to act as a binder. The best application temperature is that at which the hot bitumen will fan out well from the spray bar and coat the aggregate uniformly from top to bottom. The next very important step is to uniformly fill the surface voids with ⅜ to No. 8 choke stone promptly after each penetration application. If these surface voids are not filled, the bituminous seal will go to the bottom and fail to seal and bond the wearing surface. For seal 0.4 gallons per square yard of bituminous material is recommended. The seal is covered with a layer of ⅜ inch to No. 8 stone. Rolling and brooming follow closely after each application of choke stone to seal the cover stone. Hand labor is reduced to a minimum by using mechanical chip spreaders and broom drags. When emulsified asphalt is used the lower voids in the course should be filled with stone chips before the first penetration application.

Here again a new type of bituminous applicator is being developed which will spread the cover stone for penetration macadam or bituminous treatments 20 inches behind the spray bar. By this method the cover stone reaches the bitumen while it is very hot. Thereby bonding well to the bitumen and preventing any bitumen from flowing to low areas. Furthermore this combination bituminous applicator and chip spreader makes it impossible for traffic to drive into sticky bitumen. Bituminous macadam bases are constructed by the penetration method similar to wearing courses by reducing the amount of bitumen in the penetrating application from 0.67 gallons to 0.4 gallons per square yard per inch thick-

For a Glide Ride

The several new machines previously described for spreading, compacting and sealing macadam should and will, if properly manipulated, improve both the structural value of macadam, by giving it a more uniform composition, and a better riding surface. A glide ride in a modern high speed automobile is possible only when the pavement is free from bumps, short and long waves, and true to crown. A varying crown produces a different profile for each the right and left wheels of a motor vehicle and causes the car to sway. In order to secure a good riding surface first the subgrade must be true to cross-section and profile. If not, irregularities in the subgrade will affect the stone spreaders so that such ups and downs will show in the finished surface. While each pass of a spreader may reduce the irregularities, their wheel base is not long enough to entirely correct them. Consequently the subgrade and each succeeding course must be finished to specified crown and profile. Grade stakes should be set every 25 feet on both sides if necessary and iron pins on which grades are marked set in the center on widened and superelevated curves.

Specification provisions permitting not more than a ⅜-inch variation in 10 feet are not sufficient to give a good riding surface. We must also prevent the long irregularities which cause a wavy ride. If it is uneconomical and impractical to build base courses to true profile and section, let us prepare our designs to provide preliminary leveling courses on the base prior to placing the top course. These may be pre-mixed or mixed-in-place bituminous bound material or compacted screenings on water-bound macadam courses.

The modern macadam pavement is flexible in several ways. It is flexible in performance because it

adjusts itself to the supporting ground thereby always transmitting its wheel loads uniformly over the subgrade. In other words, it stays with the subgrade. It is still more flexible in its adaptability to many uses. As a new pavement, it can be constructed in any required thickness and of variable compositions to meet the requirements of secondary and primary roads, city streets and express-ways, airport runways and freight terminals for trucks. For airport runways, it absorbs landing shocks to a degree which is being found very desirable. It is flexible from the standpoint of being easy to widen and resurface when traffic so demands. It is flexible in design for modernizing existing pavements by widening and resurfacing. For city streets macadam simplifies the making and repairing of service cuts for underground utilities. Likewise it can readily be patched and repaired on the surface by adding bituminous patches. In conclusion, we may rightly claim for it economy, flexiblity in design and performance and capability of long life as proven by experience.

USDA'S Long-Range Farm Program

(*Continued from Page 28*)

in the reward, it must get behind this effort. It must support it where it finds a well-reasoned and well-conceived program; and where you find it ill-advised, then I think you should come in and point out the errors of the particular way and also be constructive. It is very easy to tell people, "You are doing wrong," but it is a lot more difficult to say, "You are doing it wrong and this is the way to do it right."

So, in the final analysis, you have an educational job. You have done a great job already in this industry. Credit for wartime agricultural production is due in no small part to the limestone industry and the fertilizer industry. I am sure I have not given you the impression that I know all the answers. I certainly do not. All I know is that in the minds and capacity of the American people is the force for the solution of every problem that we have to solve. We are not going to get them solved in one fell swoop by this program or any other program, because, after all, this program will suffer severely if we go into a great depression in which we suffer major unemployment. A policy of abundance in an era of vast unemployment would have an awful time surviving.

So, I leave with you this thought: We in the Department of Agriculture and the agricultural institutions in this country do not know it all. We believe you folks in your specialized fields have as much, if not more, of the know-how than we have. It is only when we get all of it spelled out together that we make real progress toward a future agricultural policy and program for this United States.

You have done a great job already in preparing for war, in helping the farmers of this country prepare for war. I see no reason why we cannot face the job of helping our farmers and our country prepare for peace. You just cannot talk about war as an inevitability. You have got to talk about peace and you have got to work for it, and this is one way, at least, in which we can all be working for it.

Ed. J. Leary

It is with deep regret that announcement is made of the death of Ed. J. Leary of the Ed. J. Leary Construction Company, River Falls, Wisconsin. "Ed", as he was affectionately known to his host of friends in the agricultural limestone industry, had not been in good health for some time and was prevented by illness from attending the 3rd Annual Convention of the Agricultural Limestone Division held in Cincinnati last January. It was, nevertheless, a great shock to learn of his death in River Falls on February 22, 1948.

During the formative stages of the Agricultural Limestone Division, Ed Leary enthusiastically gave of his time and energy. He was elected to the Board of Directors in 1946 and served until the time of his death. He was a staunch supporter of the Division's activities and will long be remembered for his fine cooperation and helpful assistance. Sincere sympathy is extended to his family and to the members of his business organization in their bereavement.

1885  1947

William McClure Andrews

In Memoriam

THE BOARD OF DIRECTORS of the National Crushed Stone Association, in meeting assembled in Cincinnati, Ohio, on January 25, 1948, during its Thirty-first Annual Convention, is deeply grieved and shocked by the sudden and unexpected death on December 28, 1947, of William McClure Andrews, President of the Union Limestone Company of New Castle, Pennsylvania, at his home in Youngstown, Ohio.

The Board is mindful of the value, over a period of many years, that Bill Andrews has been to the growth and development of our Association. His counsel and advice were always welcomed and unfailingly given in a gentle and courteous manner. He was elected to the Board of Directors in January 1927, and served continuously since that date. He was a member of the Executive Committee at various times for a total of about 10 years.

In 1942 and 1943 the Association was fortunate in having him as our President. During his administration his sterling qualities of character, his consideration for others, and his administrative ability became clearly manifest.

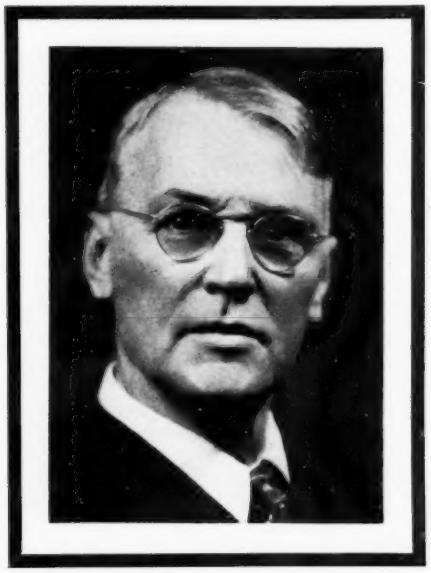
He unfailingly participated in all undertakings to further the interests of the Association and we shall especially miss not only his presence and fellowship, but his helpfulness as well. Despite all the service that Mr. Andrews, or Bill, as he was affectionately known to his countless friends, has rendered the Association, we will perhaps best remember him as a kindly gentleman in the true sense of that word, a gentle man. He will always be present with us in spirit for he was one who cannot be forgotten.

He is survived by his widow, the former Louise Wagner; a son, Upson Andrews of Youngstown; two daughters, Miss Elizabeth Andrews of New York City, and Mrs. Donald Parson of Framingham, Massachusetts; a sister, Mrs. Alice Lusk of Falmouth, Massachusetts; and a brother, Austin Andrews of Washington Depot, Connecticut.

The Board of Directors, keenly and sadly aware of the loss that not only the Board, but the Association and the industry as well, has sustained: Now here

RESOLVES, That this tribute to William M. Andrews be spread upon the minutes of this meeting of the Board of Directors, be read to the Convention assembled, and that copies thereof be sent to the members of his immediate family as an indication of our sense of loss and of our sympathetic understanding of their bereavement.

Adopted at the meeting of the Board of Directors of the National Crushed Stone Association held on January 25, 1948, at the Netherland Plaza Hotel, Cincinnati, Ohio, and read to the 31st Annual Convention of the Association at its session on Tuesday morning, January 27, 1948, following which those assembled rose in silent tribute to the memory of Bill Andrews.

1883  1947

William Stevenson Weston

In Memoriam

THE BOARD OF DIRECTORS of the National Crushed Stone Association, in meeting assembled in Cincinnati, Ohio, on January 25, 1948, during its Thirty-first Annual Convention, is grieved by the death of William Stevenson Weston at his home in Columbia, South Carolina, on October 3, 1947.

The Weston and Brooker Company, of which Mr. Weston was President at the time of his death, has held membership in this Association since 1923. It will be remembered that his brother, T. I. (Ike) Weston, was the President of this Association from 1938 to 1940.

Steve Weston, as he was called by his host of friends, was elected to our Board of Directors in January of 1941 and served continuously until January 1947. At the convention of that year he voluntarily retired as a Director and his son, W. S. Weston, Jr., was elected in his place.

Individually, we remember Steve Weston as a kindly gentleman whose counsel and advice were valued and welcomed by this Board: He was well known as an engineer and a capable executive. He contributed greatly to the development of the crushed stone industry; he was a distinguished inventor and devised and adapted numerous pieces of equipment to the use of producing and processing crushed stone.

Mr. Weston is survived by his widow, who before marriage was Miss Irene Gabray; three sons, W. S. Weston, Jr., Thomas I. Weston, and J. Caldwell Weston, and one daughter, Mrs. Edward S. Croft, Jr., of Washington, D. C. He was succeeded to the presidency of his company by his son, Steve Weston, Jr., in whom we feel that his father has left to the industry and to this Association a heritage for which we are grateful.

The Board, recognizing the loss it has sustained, as well as the Association and the industry: Now hereby

RESOLVES, That this tribute to William S. Weston be spread upon the minutes of this meeting of the Board of Directors, be read to the Convention assembled, and that copies thereof be sent to the members of his immediate family and to the Weston and Brooker Company, as an indication of our sense of loss and of our sympathetic understanding of their bereavement.

Adopted at the meeting of the Board of Directors of the National Crushed Stone Association held on January 25, 1948, at the Netherland Plaza Hotel, Cincinnati, Ohio, and read to the 31st Annual Convention of the Association at its session on Tuesday morning, January 27, 1948, following which those assembled rose in silent tribute to the memory of Steve Weston.

Status of Post War Highway Construction[1]

DURING 1947 an estimated $1,154 million of highway construction was put in place throughout the United States, a 63% increase over the 1946 expenditure of $706 million. Activity on all Federal-aid highway programs accounted for slightly more than half, or $586 million, of the 1947 total independent State work amounted to $246 million, while work at the local level accounted for an estimated $322 million. Activity on Federal-aid projects registered the largest gain over 1946—82%; followed by local work—up 49%; and independent State—up 46%.

The 1947 highway construction accomplishment constitutes a promising forward step in postwar highway construction recovery, particularly when evaluated with reference to the obstacles which have hampered the resumption of full-scale activity. The principal restrictive influences which have combined to hold back highway construction have been high costs, materials and labor shortages, and the necessity to rebuild engineering and contracting forces disorganized during the war. Moreover, less essential projects were deferred to divert men and materials to housing and other types of private construction. In cooperation with State Highway Departments, the Public Roads Administration has placed a rein on cost increases to conserve highway funds for maximum construction.

But the level of highway construction is still far below the rate necessary to make any appreciable reduction in the huge volume of accumulated and constantly growing needs. New construction requirements for additions and improvements to an overloaded highway system were huge even before the war. With wartime deferment, the backlog steadily mounted, and has pyramided still more through new demands stemming from a rapidly growing traffic volume and urban congestion. As a result, the magnitude of foreseeable, needed, new highway construction is enormous. To accomplish any effective progress toward meeting these needs would require a long-run period of activity far in excess of the 1947 rate.

1947 Highway Physical Volume Low

Expressed in current dollars, 1947 highway construction appears high, but it is important to place this volume in proper perspective. Any appraisal of the current status of highway work should take price changes into account. A better evaluation of the 1947 performance may be found when highway dollar activity over the years is expressed in 1939 dollars, giving a direct comparison of physical volume of construction.

Actually, the physical volume of highway construction in 1947, in terms of 1939 prices, is about $600 million. Although this is 43% more than in 1946, it should be noted that the physical volume recorded in 1946 was the smallest in any peacetime year since 1920. Despite the increase in 1947, physical volume was still 29% less than in 1939 and less than half the peak years of 1930 and 1931. In fact, the 1947 physical volume of highway construction was 31% less than the yearly average during the prewar period from 1925 through 1941. The physical volume of highway work done in 1947 was actually less than recorded in any of the 17 years prior to the war except for 1935. The brief table below gives the value of highway construction in contrast to the actual physical volume of work put in place.

Highway Activity Expressed in Current Dollars and 1939 Dollars

	Current Dollars[2]	1939 Dollars[3]
	(millions of dollars)	
1925	1,056	714
1930	1,481	1,255
1935	622	560
1939	835	835
1941	850	754
Average 1925-41	986	859
1946	706	417
1947	1,154	597

In contrast, other types of construction—notably private residential, industrial, and commercial building—have experienced a more vigorous postwar expansion. Whereas highway construction in 1947 (expressed in terms of physical volume) was 29% under 1939, industrial building last year was three times the 1939 physical accomplishment; commercial building was up about 60%; and private residential building up approximately 20%.

1947 Highway Awards Rose Moderately Over 1946

Contracts awarded for highway construction in 1947 were valued at $1,096 million or 18% above the

[1] Prepared for March Issue of PUBLIC CONSTRUCTION, Office of Economic Research, Federal Works Agency.
[2] Data from the Departments of Commerce and Labor.
[3] Conversion based on composite mile index of costs prepared by the Public Roads Administration.

$928 million awarded in 1946. Nearly 60% or $648 million were awards in the Federal-aid programs, a 25% increase over the previous year. State highway contracts with no Federal funds involved increased 12% over the 1946 volume to total $257 million. Contracts awarded for road work by counties and municipalities in 1947 showed the smallest over-the-year gain, 6%, to total $192 million. These data reflect the inception or starting rate of new highway work and should not be confused with the value-in-place data.

Costs of Highway Modernization Necessitate Long-Range Program

COSTS of meeting accumulated deficiencies on the nation's highway system can be met only through a long-range program with continuous Federal aid at a high level through the years ahead, Charles M. Upham, Engineer-Director of the American Road Builders' Association, told engineers meeting in Washington recently.

"Studies and reports from various states indicate the magnitude of today's highway needs," he said. "For nearly 15 years highway construction has been slowed down and replacement deferred until the problem has become acute."

Mr. Upham cited the recently released 18-month study of the Michigan Good Roads Federation showing that Michigan's highways and streets have deteriorated until $1.4 billion must be spent during the next 12 or 15 years to bring them up to date.

He also noted the recent report of Charles H. Sells, Superintendent of New York State Department of Public Works, showing that a $2 billion 14-year program of modernization is needed if the state's highways are to be as efficient as they were 17 years ago.

These programs, Mr. Upham added, are small when compared with California's $18 billion 10-year program which was legally financed for construction after a 15-month campaign.

Inadequate revenue during depression years and wartime curtailment of construction have caused highway modernization to lag far behind steadily increasing traffic volume, the ARBA director pointed out.

"During the period existing deficiencies are being overcome, roads and streets now adequate will wear out and require replacement," he said, referring to a recent report from Public Roads Administration estimating replacement needs of the 614,000 miles of Federal-aid highways at 40,000 miles annually for the period 1947-1958.

He added that, during 1947, legislatures in ten states provided for long-range highway planning studies.

"The necessary program of modernization must be met in the most efficient and economical manner," Mr. Upham said. "Evaluation of needs and long-range planning to meet them will aid states in doing the job in minimum time with maximum efficiency.

"Highway needs in these three states indicate the vast task ahead," Mr. Upham continued. "The phenomenal increase in highway use makes new facilities necessary in all parts of all states. Only by a continuous program of Federal aid can long-range plans to make our highway system adequate be carried out," he concluded.

Three-Year Federal-Aid Highway Bill Approved by House Committee

THE House Committee on Public Works has approved a revised version of the latest Cunningham bill, to be known as the Federal-Aid Highway Act of 1948, calling for annual authorization of $500 million for three years beginning in the fiscal year ending June 30, 1950. It is expected that the bill will be reported out of committee soon for action by the House.

Leaving the annual authorization and allocation formula unchanged from the Act of 1944, the bill provides that funds shall be made available to the states until June 30, 1955.

The proposed Act of 1948 specifies that 45 per cent of each year's authorization be spent on the Federal-aid highway system. In stipulating that 30 per cent shall be spent on secondary and feeder roads, the bill broadens its language to include in this category township as well as county roads. The remainder, or 25 per cent, shall be spent for projects on the Federal-aid highway system in urban areas.

In addition, the bill provides authorization of $25,000,000 for forest highways, $12,500,000 for forest development roads and trails, $4,250,000 for roads and trails in national parks, $10,000,000 for national park access roads, and $6,000,000 for Indian reservation roads and bridges.

Meanwhile, Senate committee action on Federal-aid bills apparently has been delayed by the press of other matters. Public hearings were completed recently.

MANUFACTURERS' DIVISION

of the

NATIONAL CRUSHED STONE ASSOCIATION

These associate members are morally and financially aiding the Association in its efforts to protect and advance the interests of the crushed stone industry. Please give them favorable consideration whenever possible.

Allis-Chalmers Mfg. Co.
Milwaukee, Wis.
Crushing, Screening, Washing, Grinding, Cement Machinery; Motors; Texrope Drives; Centrifugal Pumps; Tractors

American Cyanamid Co.
Explosives Department
30 Rockefeller Plaza, New York 20, N. Y.
Explosives and Blasting Supplies

American Manganese Steel Division of American Brake Shoe Company
389 East 14th St., Chicago Heights, Ill.
Manganese Steel Castings, Power Shovel Dippers, Material Handling Pumps, Heat and Corrosion Resistant Castings, Reclamation and Hard-Facing Welding Materials

American Pulverizer Co.
1249 Macklind Ave., St. Louis, Mo.
Manufacturers of Ring Crushers and Hammermills for Primary and Secondary Crushing

Atlas Equipment Corp.
635 Ridge Ave., Pittsburgh 12, Pa.
Shovels; Cranes; Draglines; Moto-Cranes; Earth Hauling Equipment; Road Rollers; Trailers; Asphalt Equipment; Pumps; Buckets; TracTracTors; Power Units; Tractors; Crushers; Asphalt Plants; Air Compressors; Shop Mules; Dirt Moving Equipment

Atlas Powder Co.
Wilmington, Del.
Industrial Explosives and Blasting Supplies

Bacon-Greene & Milroy
205 Church St., New Haven, Conn.
"FARREL-BACON" Jaw Crushers for Primary and Secondary Operation. Conveyors, Elevators, Rolls, Screens

Bacon-Pietsch Co., Inc.
149 Broadway, New York 6, New York
Manufacturers of Farrel-Bacon Crushers and allied Screening & Conveying Equipment

Barber-Greene Co.
Aurora, Illinois
Portable and Permanent Belt Conveyors, Belt Conveyor, Idlers, Bucket Loaders both Wheel and Crawler Mounted, Asphalt Mixers and Finishers, Coal Handling Machines

C. G. Buchanan Crushing Machinery Division of the Birdsboro Steel Foundry and Machine Co.
1941 Furnace St., Birdsboro, Pa.
Primary, Secondary and Finishing Crushers and Rolls

Bucyrus-Erie Co.
South Milwaukee, Wis.
Excavating, Drilling and Material Handling Equipment

Cross Engineering Co.
Carbondale, Pa.
Screen Plates and Sections, Perforated Plate, for Vibrating, Rotary and Shaking Screens

Cummins Engine Co., Inc.
Columbus, Ind.
Diesel Engines, Fuel Pumps

Deister Machine Co.
1933 East Wayne Street, Fort Wayne, Ind.
Deister Plat-O Vibrating Screen, Deister Compound Funnel Classifier

Detroit Diesel Engine Division General Motors Corp.
13400 West Outer Drive, Detroit 23, Mich.
Light Weight, Compact 2 Cycle Diesel Engines and "Package Power" Units for All Classes of Service

Diamond Iron Works, Inc.
Minneapolis, Minn.
Rock Crushing, Conveying and Transmission Machinery

E. I. du Pont de Nemours & Co., Inc.
Wilmington, Del.
Explosives and Blasting Accessories

MANUFACTURERS' DIVISION of the NATIONAL CRUSHED STONE ASSOCIATION

Easton Car and Construction Co.

Heavy-Duty Dump Body Trailers for Rock and Ore, Truck Bodies and Quarry Cars. Overhead Hoists for Dumping Haulage Units. Electric Heaters for Tar, Asphalt or Bitumen.

Ensign-Bickford Co.

Simsbury, Conn.

Cordeau-Bickford Detonating Fuse and Safety Fuse

Euclid Road Machinery Co.

1361 Chardon Road, Cleveland 17, Ohio

Heavy-Duty Trucks and Dump Trailers for "Off Highway" Hauls, Loaders for Earth Excavation

Frog, Switch & Mfg. Co.

Carlisle, Pa.

Manganese Steel Department—Manufacturers of "Indian Brand" Manganese Steel Castings for Frogs, Switches and Crossings, Jaw and Gyratory Crushers, Cement Mill, Mining Machinery, etc., Steam Shovel Parts

General Electric Co.

1 River Road, Schenectady N. Y.

Electric Motors

Goodyear Tire & Rubber Co.

Akron, Ohio

Belting (Conveyor, Elevator, Transmission), Hose (Air, Water, Steam, Suction, Miscellaneous), Chute Lining (Rubber)

Gruendler Crusher and Pulverizer Co.

2915 N. Market St., St. Louis, Mo.

Rock and Gravel Crushing and Screening Plants, Jaw Crushers, Roll Crushers, Hammer Mills, Lime Pulverizers

George Haiss Mfg. Co., Inc.

381 Canal Place, Bronx, New York 51, N. Y.

Clamshell Buckets, Portable Conveyors

Harnischfeger Corp.

4400 W. National Ave., Milwaukee 14, Wis.

A complete line of Power Excavating Equipment, Overhead Cranes, Hoists, Smootharc Welders, Welding Rod, Motors and Generators

HarriSteel Products Co.

420 Lexington Ave., New York 17, N. Y.

Woven Wire Screen Cloth

Hayward Co.

50 Church Street, New York City

Orange Peel Buckets, Clam Shell Buckets, Electric Motor Buckets, Automatic Take-up Reels

E. Lee Heidenreich, Jr., Consulting Engineers

67 Second St., Newburgh, N. Y.

Plant Layout, Design, Supervision; Open Pit Quarry Surveys; Appraisals—Plant and Property

Hendrick Mfg. Co.

Carbondale, Pa.

Perforated Metal Screens, Perforated Plates for Vibrating, Shaking and Revolving Screens; Elevator Buckets; Hendrick Vibrating Screens

Hercules Powder Co.

Wilmington, Del.

Explosives and Blasting Supplies

Hetherington & Berner Inc.

701-745 Kentucky Ave., Indianapolis 7, Ind.

Asphalt Paving Machinery, Sand and Stone Dryers, Dust Collectors

Illinois Powder Mfg. Co.

124 N. 4th St., St. Louis, Mo.

Gold Medal Explosives

Ingersoll-Rand Co.

11 Broadway, New York 4, N. Y.

Rock Drills, Quarrymaster Drill, Jackbits, Bit Reconditioning Equipment, Portable and Stationery Air Compressors, Air Hoists, Slusher Hoists, Air Tools, Diesel Engines, Pumps

Insley Manufacturing Corp.

801 N. Olney St., Indianapolis, Ind.

Concrete Carts and Buckets, ½ Yd. Cranes and Shovels

Iowa Manufacturing Co.

Cedar Rapids, Iowa

Rock and Gravel Crushing, Screening, Conveying and Washing Plants, Hot and Cold Mix Asphalt Plants, Stabilizer Plants, KUBIT Impact Breakers, Screens, Elevators, Conveyors, Portable and Stationary Equipment, Hammermills

Jeffrey Manufacturing Co.

E. First Ave., Columbus 16, Ohio

Material Handling Machinery, Crushers, Pulverizers, Screens, Chains

MANUFACTURERS' DIVISION of the NATIONAL CRUSHED STONE ASSOCIATION

Kennedy-Van Saun Mfg. and Eng. Corp.
2 Park Ave., New York City
Material Handling Machinery—Crushers, Pulverizers, Vibrating Screens

Kensington Steel Co.
505 Kensington Ave., Chicago, Ill.
Manganese Steel Castings, Dipper Teeth, Crawler Treads, Jaw Plates, Concaves and Hammers

Keystone Driller Co.
Beaver Falls, Pa.
Drills, Power Shovels

King Powder Co., Inc.
Cincinnati, Ohio
Detonite, Dynamites, and Blasting Supplies

Koehring Co.
3026 W. Concordia Ave., Milwaukee, Wis.
Mixers, Pavers, Shovels, Cranes, Draglines, Dumptors, Traildumps, Mud-Jacks

Lima Shovel and Crane Division Lima-Hamilton Corp.
1108 Lima Trust Bldg., Lima, Ohio
Power Shovels, Draglines and Cranes

Link-Belt Co.
300 West Pershing Road, Chicago, Ill.
Complete Stone Preparation Plants. Conveyors, Elevators, Screens, Washing Equipment, Speed-o-Matic Shovels—Cranes—Draglines and Power Transmission Equipment

Ludlow-Saylor Wire Co.
Newstead Ave. & Wabash R. R., St. Louis, Mo.
Woven Wire Screens and Wire Cloth of Super-Loy, Magna-Loy and All Commercial Alloys and Metals

Mack Manufacturing Corp.
350 Fifth Ave., New York 1, N. Y.
Trucks, Truck-Tractors of All Types and Capacity, Gasoline or Diesel Power Optional

Maguire Industries, Incorporated
Nostrip Division
122 E. 42nd St., New York 17, N. Y.
Nostrip, Roctreet

Marion Power Shovel Co.
Marion, Ohio
A Complete Line of Power Shovels, Draglines and Cranes

E. F. Marsh Engineering Co.
4324 W. Clayton Ave., St. Louis, Mo.
Building Materials Handling Equipment; Engineered MARCO Products

McLanahan & Stone Corp.
Hollidaysburg, Pa.
Complete Pit, Mine and Quarry Equipment —Crushers, Washers, Screens, Feeders, etc.

Murphy Diesel Co.
5317 W. Burnham, Milwaukee, Wis.
Murphy Diesel Engines Ranging from 90 to 165 Continuous Horsepower at 1200 Rpm. and Packaged Type Generator Sets 60 Kw. to 106 Kw. for All Classes of Service

New Holland Machine Co.
New Holland, Pa.
Limestone Pulverizers; Jaw, Roll, and Hammer Crushers; Elevators; Revolving and Vibrating Screens; Dewaterers; Belt and Apron Conveyors; Conveyor Belting; V-Belts; V-Belt Drives; Engines; Electric Motors; Concrete Mixers With or Without Power Lifts

Noble Co.
1860 7th St., Oakland 7, Calif.
Batching Plants, Bulk Cement Plants

Nordberg Mfg. Co.
Milwaukee, Wis.
Cone, Gyratory, Jaw and Impact Crushers; Grinding Mills; Stone Plant and Cement Mill Machinery; Vibrating Screens; Grizzlies; Diesel and Steam Engines; Compressors; Mine Hoists; Track Maintenance Tools

Northern Blower Co.
65th St. South of Denison, Cleveland, Ohio
Dust Collecting Systems, Fans—Exhaust and Blowers

Northwest Engineering Co.
135 S. LaSalle St., Chicago 3, Ill.
Shovels, Cranes, Draglines, Pullshovels

Pennsylvania Drilling Co.
1205 Chartiers Ave., Pittsburgh 20, Pa.
Diamond Core Drilling, Blast Hole Drilling, Core Drills and Supplies

Pioneer Engineering Works, Inc.
1515 Central Avenue, Minneapolis, Minn.
Jaw and Roll Crushers, Vibrating and Revolving Screens, Scrubbers, Belt Conveyors, Traveling Grizzley Feeder

MANUFACTURERS' DIVISION of the

NATIONAL CRUSHED STONE ASSOCIATION

Pit and Quarry Publications
538 South Clark St., Chicago, Ill.
Pit and Quarry, Pit and Quarry Handbook, Pit and Quarry Directory, Concrete Manufacturer, Concrete Industries Yearbook

Quaker Rubber Corp.
Tacony and Milnor Sts., Philadelphia 24, Pa.
Conveyor Belts, Hose and Packings

Robins Conveyors Division, Hewitt-Robins Incorporated
270 Passaic Avenue, Passaic, N. J.
Belt Conveyors, Bucket Elevators, Gyrex and Vibrex Screens, Feeders, Design and Construction of Complete Plants

Rock Products
309 West Jackson Blvd., Chicago, Ill.

Sanderson-Cyclone Drill Co.
South Main St., Orrville, Ohio
All Steel Wire Line, Air Speed Spudder, Large Blast Hole Drills, Drilling Tools and Drilling Supplies

Screen Equipment Co.
9 Lafayette Ave., Buffalo, N. Y.
SECO Vibrating Screens

Simplicity Engineering Co.
Durand, Mich.
Simplicity Gyrating Screen, Simplicity D'centegrator, Simplicity D'watering Wheel

Smith Engineering Works
E. Capitol Drive at N. Holton Ave., Milwaukee, Wis.
Gyratory, Gyrasphere, Jaw and Roll Crushers, Vibrating and Rotary Screens, Gravel Washing and Sand Settling Equipment, Elevators and Conveyors, Feeders, Bin Gates, and Portable Crushing and Screening Plants

St. Regis Sales Corp.
1925 O'Sullivan Bldg., Baltimore 2, Md.
Main Office: 230 Park Ave., New York 17, N. Y.
Automatic Filling and Weighing Machines and Multiwall Paper Shipping Sacks

Stedman's Foundry & Machine Works
Aurora, Indiana
Stedman Impact-Type Selective Reduction Crushers, 2-Stage Swing Hammer Limestone Pulverizers

Stephens-Adamson Mfg. Co.
Aurora, Ill.
Belt Conveyors, Elevators, Feeders, Car Pullers, Screens, Skip Hoists, Complete Plants

Taggart Corp.
(See St. Regis Sales Corp.)

W. O. & M. W. Talcott, Inc.
91 Sabin St., Providence, R. I.
Belt Fasteners, Belt Lacing, Conveyor Belt Fasteners, and Patch Fasteners

Taylor-Wharton Iron & Steel Co.
High Bridge, N. J.
Manganese and other Special Alloy Steel Castings

Thew Shovel Co.
Lorain, Ohio
Power Shovels, Cranes, Crawler Cranes, Locomotive Cranes, Draglines. Diesel Electric, Gasoline. 3/8 to 2-1/2 Cu. Yd. Capacities

Traylor Engineering & Mfg. Co.
Allentown, Pa.
Stone Crushing, Gravel, Lime and Cement Machinery

Trojan Powder Co.
17 N. 7th St., Allentown, Pa.
Explosives and Blasting Supplies

W. S. Tyler Co.
3615 Superior Ave., N. E., Cleveland, Ohio
Wire Screens, Screening Machinery, Scrubbers, Testing Sieves and Dryers

Unit Crane and Shovel Corp.
6411 W. Burnham St., Milwaukee 14, Wis.
Power Cranes and Shovels: Unit 514, ½ Yd. Crawler; Unit 1020, ¾ Yd. Crawler and Truck Mounted; Unit 357, ½ Yd. Self-Propelled Mobile Crane; Unit 1014, ½ Yd. Truck Mounted; Unit 1520, ¾ Yd. Self-Propelled Mobile; Every UNIT Model Completely Convertible to All Attachments

Universal Engineering Corp.
625 C Ave., N.W., Cedar Rapids, Iowa.
Jaw Crushers, Roll Crushers, Hammermills, Complete Crushing, Screening and Loading Plants, Either Stationary or Portable for Stone Aggregates or Aglime

Vibration Measurement Engineers
7721 Sheridan Rd., Chicago, Ill.

Technical Publications

of the

National Crushed Stone Association

◈

ENGINEERING BULLETINS

No. 1. The Bulking of Sand and Its Effect on Concrete

No. 2. Low Cost Improvement of Earth Roads with Crushed Stone

No. 3. The Water-Ratio Specification for Concrete and Its Limitations
(Supply Exhausted)

No. 4. "Retreading" Our Highways

No. 5. Reprint of "Comparative Tests of Crushed Stone and Gravel Concrete in New Jersey" with Discussion

No. 6. The Bituminous Macadam Pavement

No. 7. Investigations in the Proportioning of Concrete for Highways.

No. 8. The Effect of Transportation Methods and Costs on the Crushed Stone, Sand and Gravel, and Slag Industries
(Supply Exhausted)

No. 9. Tests for the Traffic Durability of Bituminous Pavements

No. 10. Stone Sand

No. 11. A Method for Proportioning Concrete for Compressive Strength, Durability and Workability

---

STONE BRIEFS

No. 1. How to Proportion Workable Concrete for Any Desired Compressive Strength

No. 2. How to Proportion Concrete for Pavements

No. 3. Uses for Stone Screenings

No. 4. How to Determine the Required Thickness of the Non-Rigid Type of Pavement for Highways and Airport Runways

---

Single copies of the above publications are available upon request.

Manual of Uniform Cost Accounting Principles and Procedure for the Crushed Stone Industry ($2.00 per copy)